RICE UNIVERSITY

Void Off Center

by

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A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE

Master of Architecture

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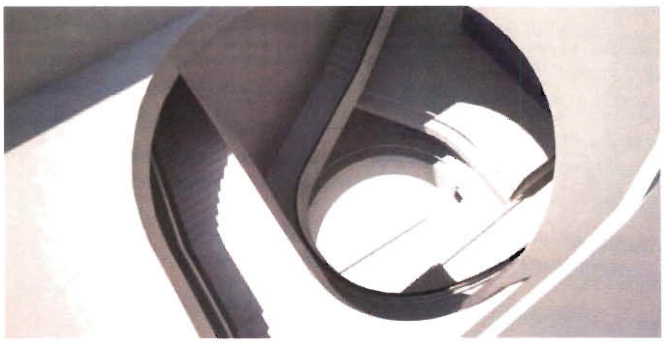
Void Off Center

This thesis exploits the potentials of the off centered void. While geometric rigidity confines the conventional void, eccentric alignments in Void Off Center escape those defining boundaries. These eccentricities extend the influence of the void to open up new possibilities for both program and circulation.

Void Off Center uses a system of axial voids and lobes. Like an engine's camshaft, this setup can be tuned to regulate the parts and movements of the larger whole. Embedded into the plate structure, this combination of voids and lobes catalyzes an agile spatial constellation. These potentials are tested in the design of a museum. Proposed as an expansion to Houston's Museum of Fine Arts, this project organizes each of the main museum functions (exhibition, public, service) around a particular void, giving each an identity.

Program in Void Off Center resists conforming to spatial definition. Voids animate programmatic boundaries as walls, floor plates, and material surfaces intersect or lap each other, creating multiple interactions. Circulation in Void Off Center follows an open trajectory. It loops in and out of orbit around the voids, creating a movement that is both episodic and unified. Both Program and circulation are drawn together by the void at multiple scales and illuminated with an overall legibility.



Acknowledgments

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Jason and Eunike for helping out in the final week,

John for making the trip,

My parents for always being there,

Albert and Sarah for their insight,

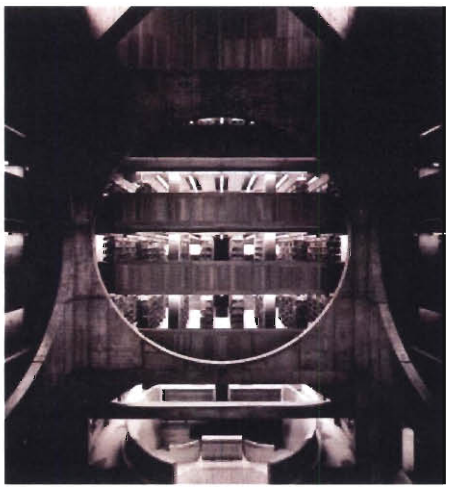
and to Ron, for teaching me to see what is important

Contents

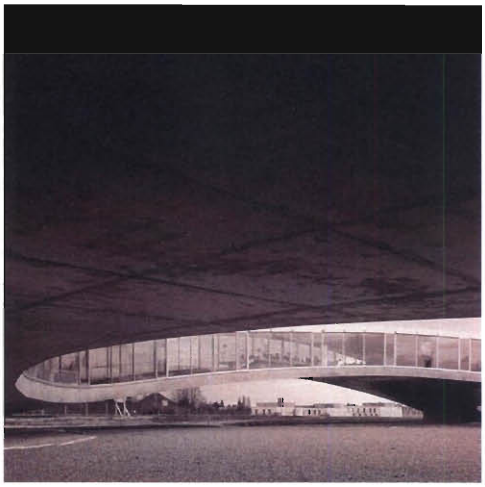
Introduction

The void tracks through the DNA of architecture in various forms such as the rotunda, cortile, drum, court, or atrium among others.[1] In all these forms, the void occupies a space of its own identity. The following section introduces three important void buildings: Schinkel's Altes Museum, Kahn's Exeter Library, and SANAA's Rolex Learning Center. These buildings are ruptures in the lineage of the void - each one illustrates a shift in the void's relevance to architecture. For each project, I present a two-part analysis. The first part dissects the break from convention while the second part points out limitations that could be further explored.

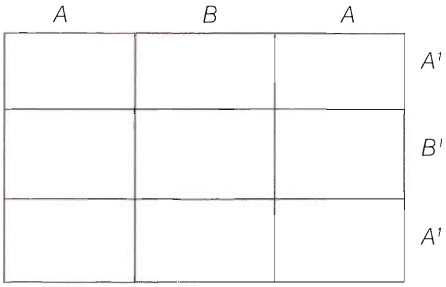
Altes Museum
K.F. Schinkel - Berlin, Germany 1830



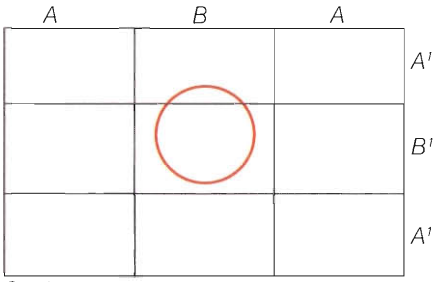
Exeter Library
Louis Kahn - Exeter, New Hampshire 1972



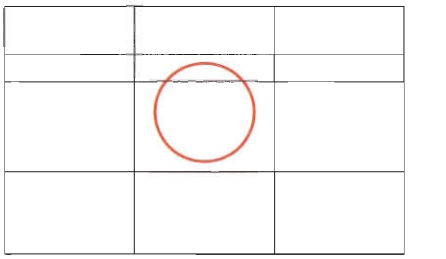
Rolex Learning Center
SANAA - Lausanne, Switzerland 2010



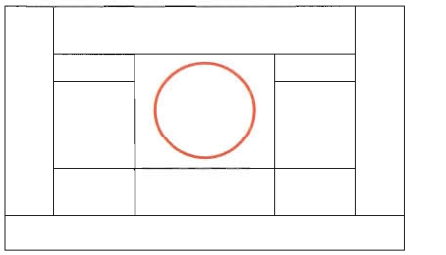
Schinkel begins with a classically subdivided plan. Regulating lines in the form of a cruciform create bilateral symmetry across both axes.



Schinkel inserts the cylindrical void (with a diameter greater than B¹) and shifts it up in plan to intersect with the top line.

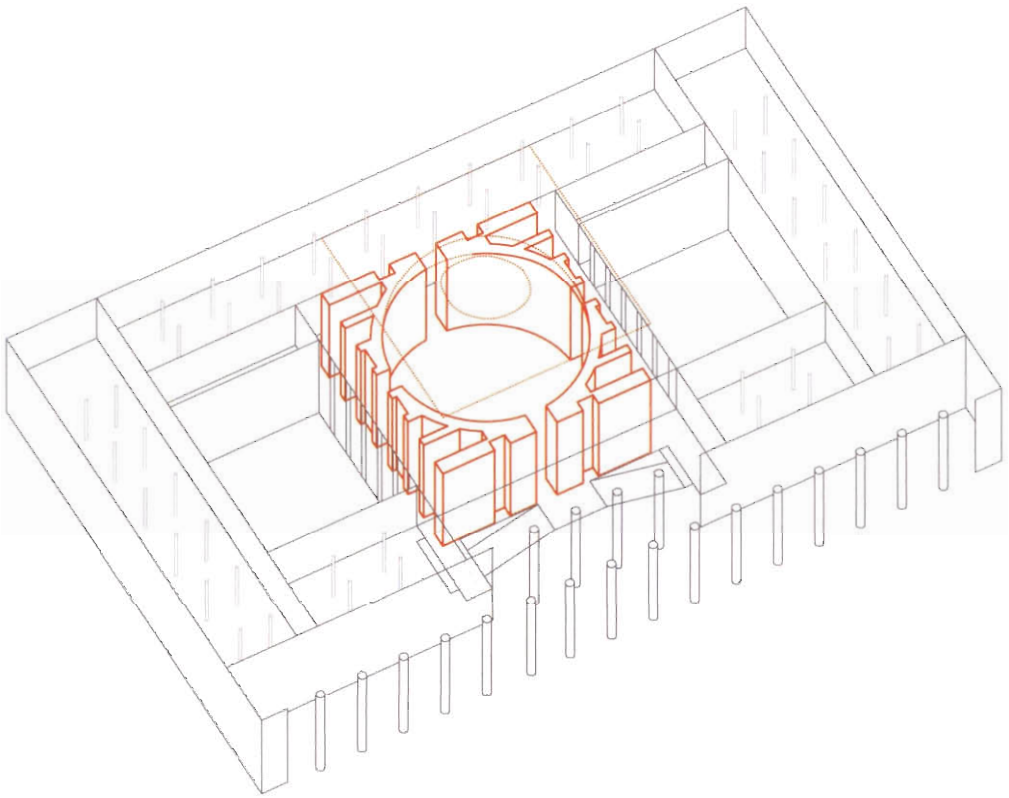


A parallel tangent line is then drawn from the top of the circle, resulting in an atypical band of spaces positioned in between the rear gallery and the two open courts.

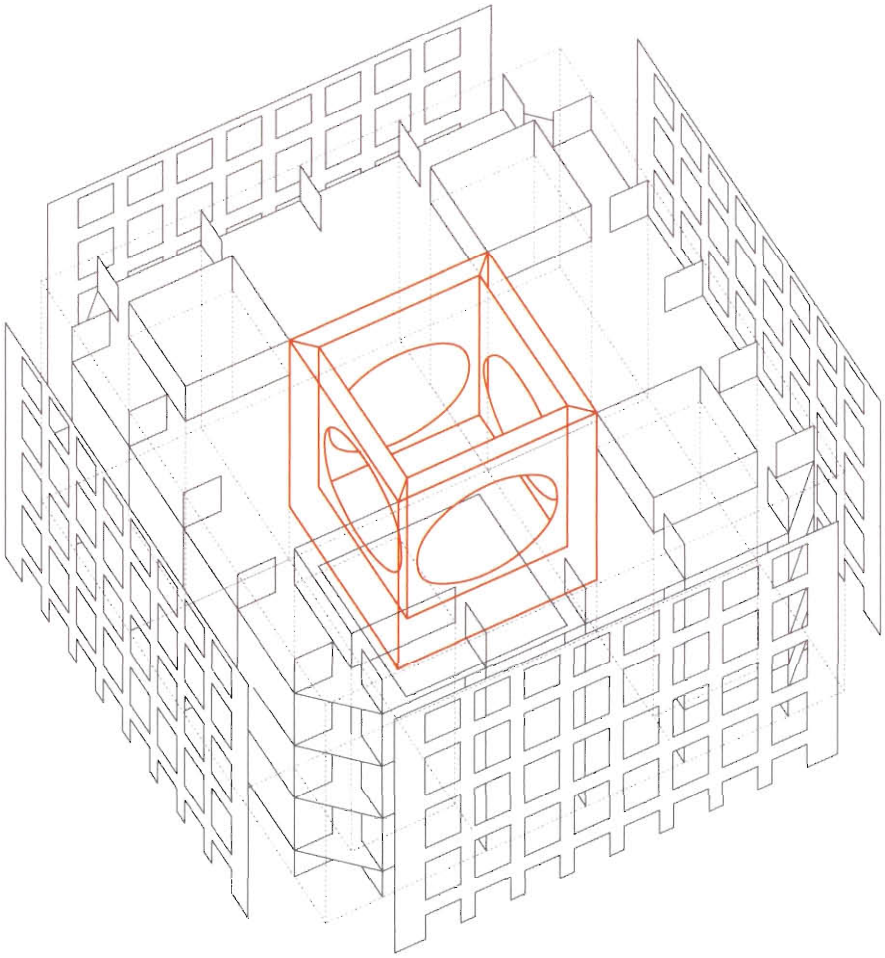


Altes Museum

In Schinkel's Altes Museum, the unconventional placement of the void registers a change to pre-established ordering principles. The overlap that occurs between the void and the regulating lines transforms the subdivisions of the classical plan.

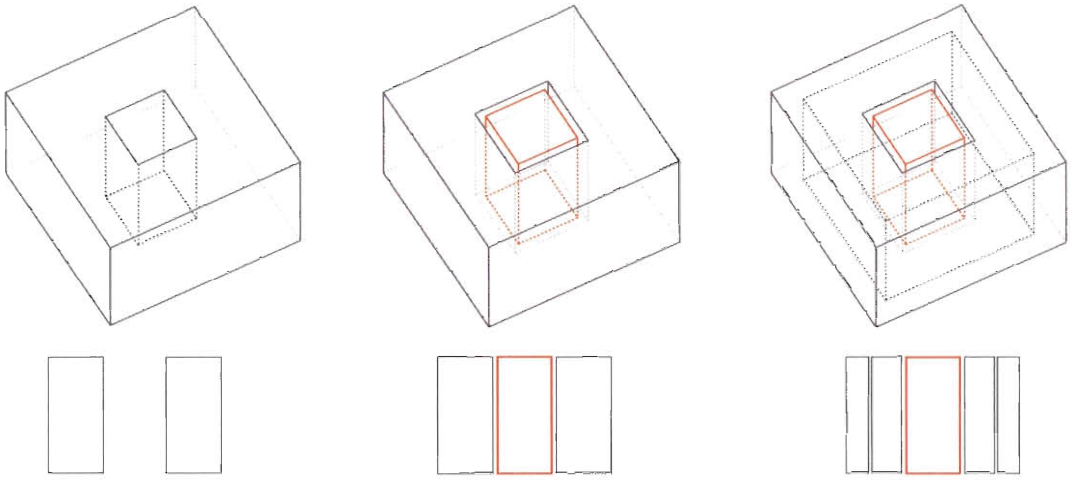


Although the void in the Altes Museum refuses the bounds of classical geometry and alters the conventions of symmetry, hierarchy, and organization in the classical plan, its presence is still contained to a small area. With the exception of four small portals, the void is fully enclosed, blocking possible connections with its surroundings.

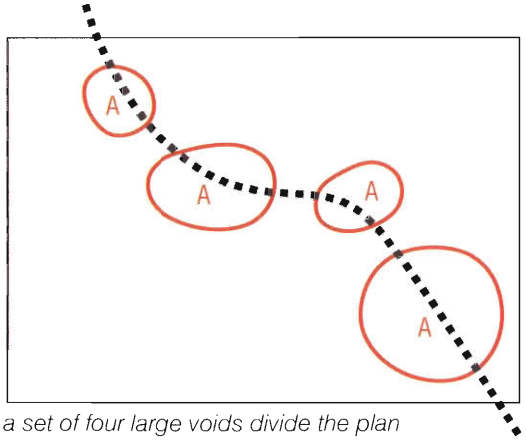


Exeter Library

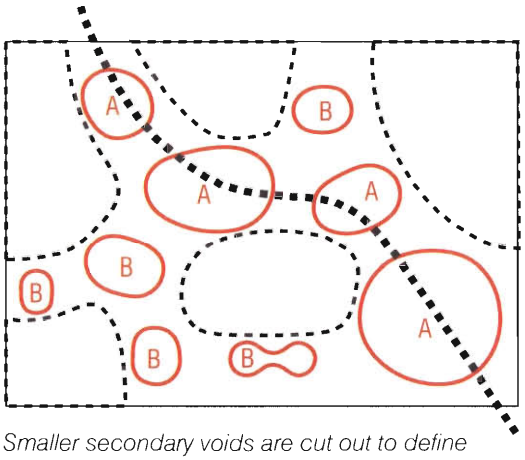
Unlike the void in the Altes Museum, the void in the Exeter Library is visible from all parts of the building. By taking up the entire central volume of the 9-square grid, the void makes up the middle 1/3 of the building's section. Additionally, the void reaches beyond its boundaries by extending its corners outward, in the form of an X. The prominence of the void's geometry is registered in the plan, where orthogonal walls deflect or stop short to avoid intersecting with the path of the void's corners. This is also true of the façades, which stop short of meeting at the outside corners. The lack of interference along these diagonals results in vertical gaps through which the void can be seen.



However, this dominating void also crowds out the rest of the building, pushing program and circulation to the perimeter. With the exception of the ground floor, program and circulation can only occupy the space between the void and the building envelope. Subsequently, the issue of depth becomes the dictating constraint. Kahn's solution pushes the book stacks (which don't need light) in towards the void, and pulls the study carrels (which do need light) out to the edges. Though this strategy works at Exeter because of the peculiarities of the library program, its applications are limited.



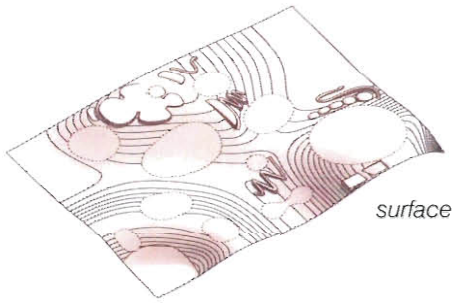
a set of four large voids divide the plan diagonally.



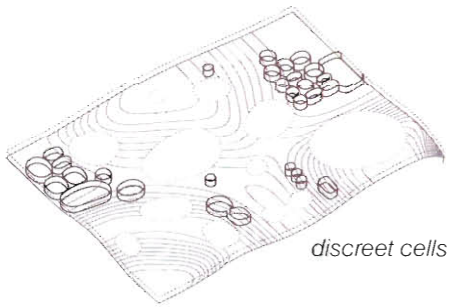
Smaller secondary voids are cut out to define sub-zones.

Rolex Learning Center

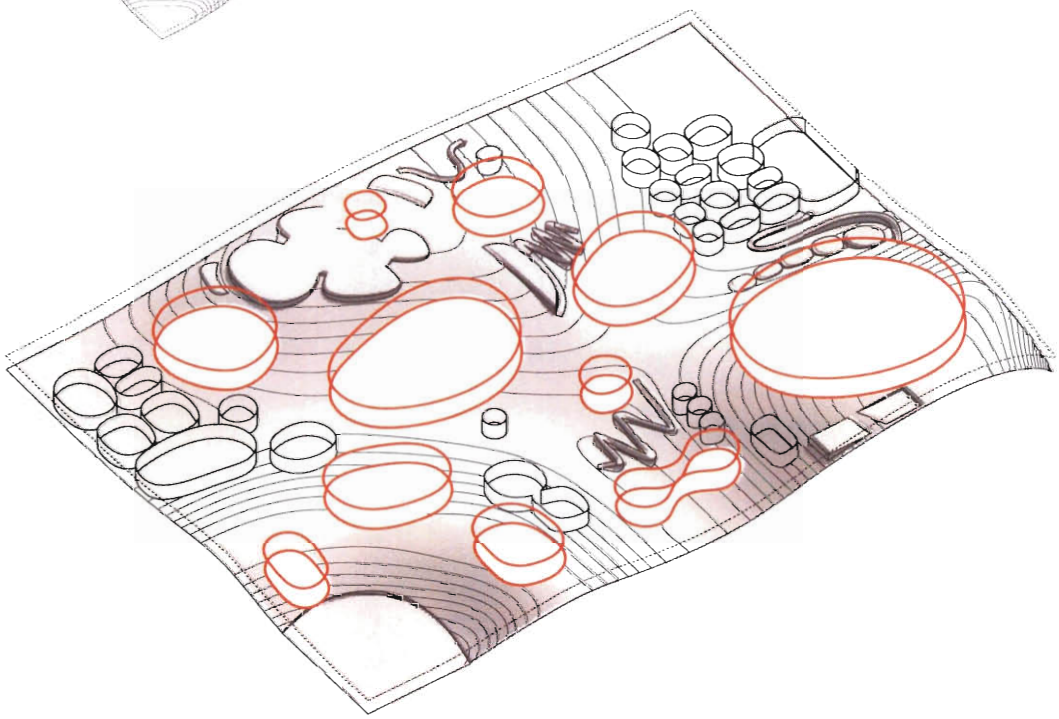
The Rolex Learning Center uses several voids to create various zones throughout the building. The arrangement of these voids, their size, and their relationship to the topography of the plate allows these zones to vary in height, scale, and contextual orientation.



surface



discreet cells



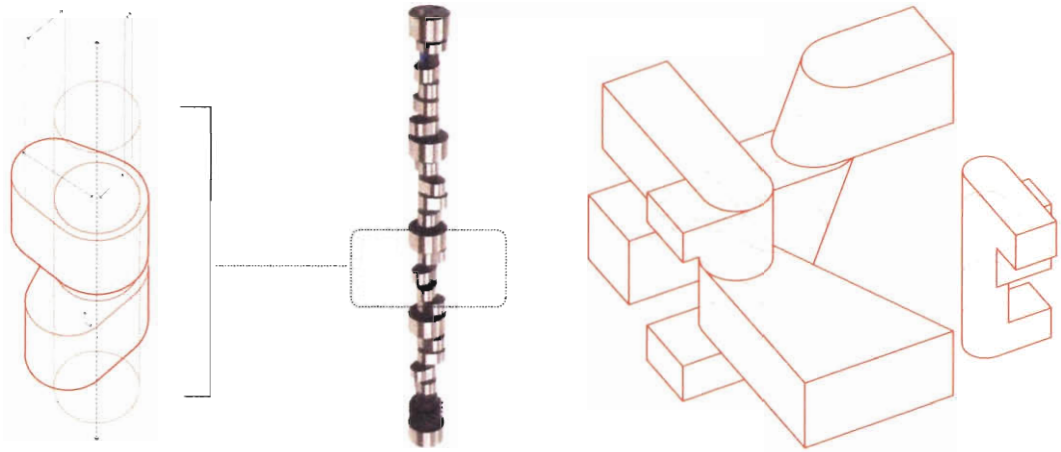
While the use of the voids is effective at an organizational level, it is insignificant at the programmatic level. The entire building seems indiscriminately porous – the voids do not account for specificities. For example, the need for programmatic discreetness (in classrooms and offices) is accommodated by dropping spatial cells onto the surface - a technique that reverts back to conventional programmatic adjacencies and enclosures.

Old Void

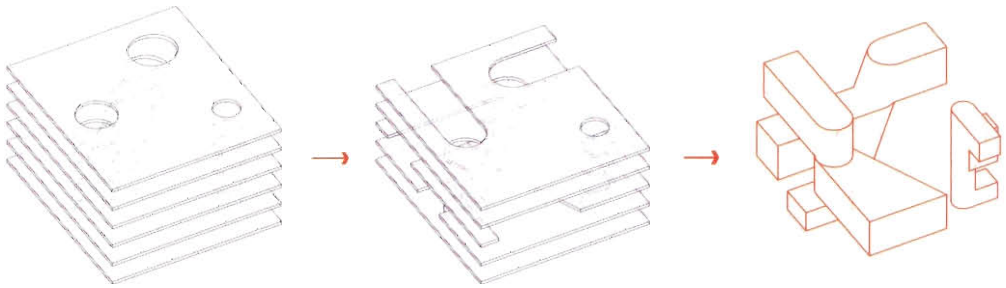
These buildings reveal a common trend – a void is conceived as a vertical extrusion of a shape in plan. But while this void model is a powerful, vertical connector, it has limited lateral impact. This is evidenced in the Altes Museum, where the void is contained in the center. Subsequently, attempts at giving the void more lateral influence has resulted in bigger voids (Exeter Library) or many voids (Rolex Learning Center). In either alternative, the void remains a static unit that is merely inflated or multiplied.

Camshaft: New Void

Rather than recycling these old models, Void Off Center uses a conceptual model borrowed from the automobile - the camshaft. This mechanism, used to control valve openings in the engine, consists of a continuous rod with lobes attached to it. As the rod rotates, the location, orientation, and shape of the lobes determine the timing of individual valve openings. By tuning and adjusting this small component, the performance of the larger machine can be optimized. This new void model is embedded into the contemporary building structure by drilling into and cutting away from each plate. By recasting the void as a camshaft, - with vertical axis and lateral lobes - it is free to extend laterally. Liberated from the stiffness, the void creates a more agile spatial constellation.

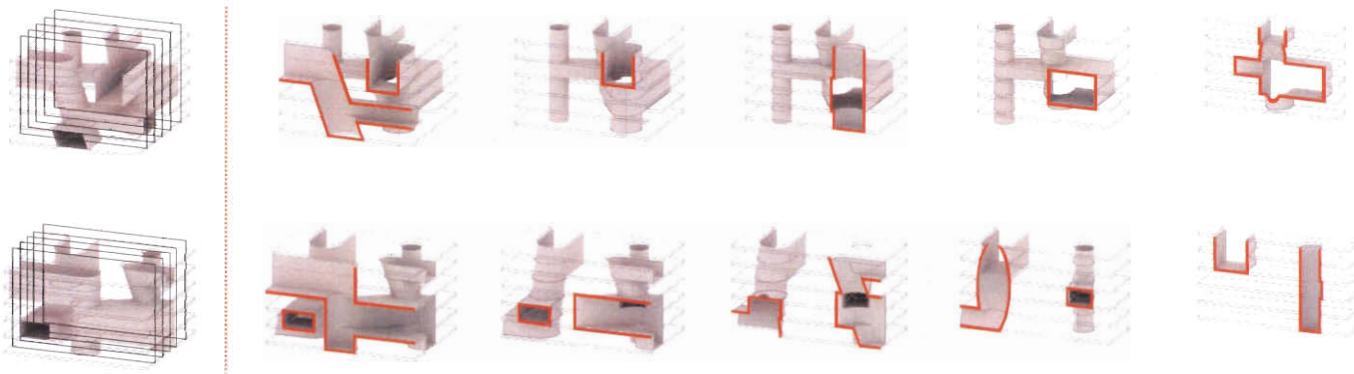


Camshaft: *vertically axial laterally eccentric*

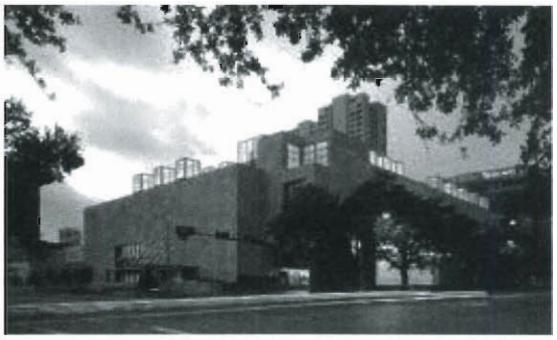


Camshaft Embedded

This new void model is embedded into the contemporary building structure by drilling into and cutting away from each plate. By recasting the void as a camshaft, - with vertical axis and lateral lobes - it is free to extend laterally. Liberated from the stiffness, the void creates a more agile spatial constellation.



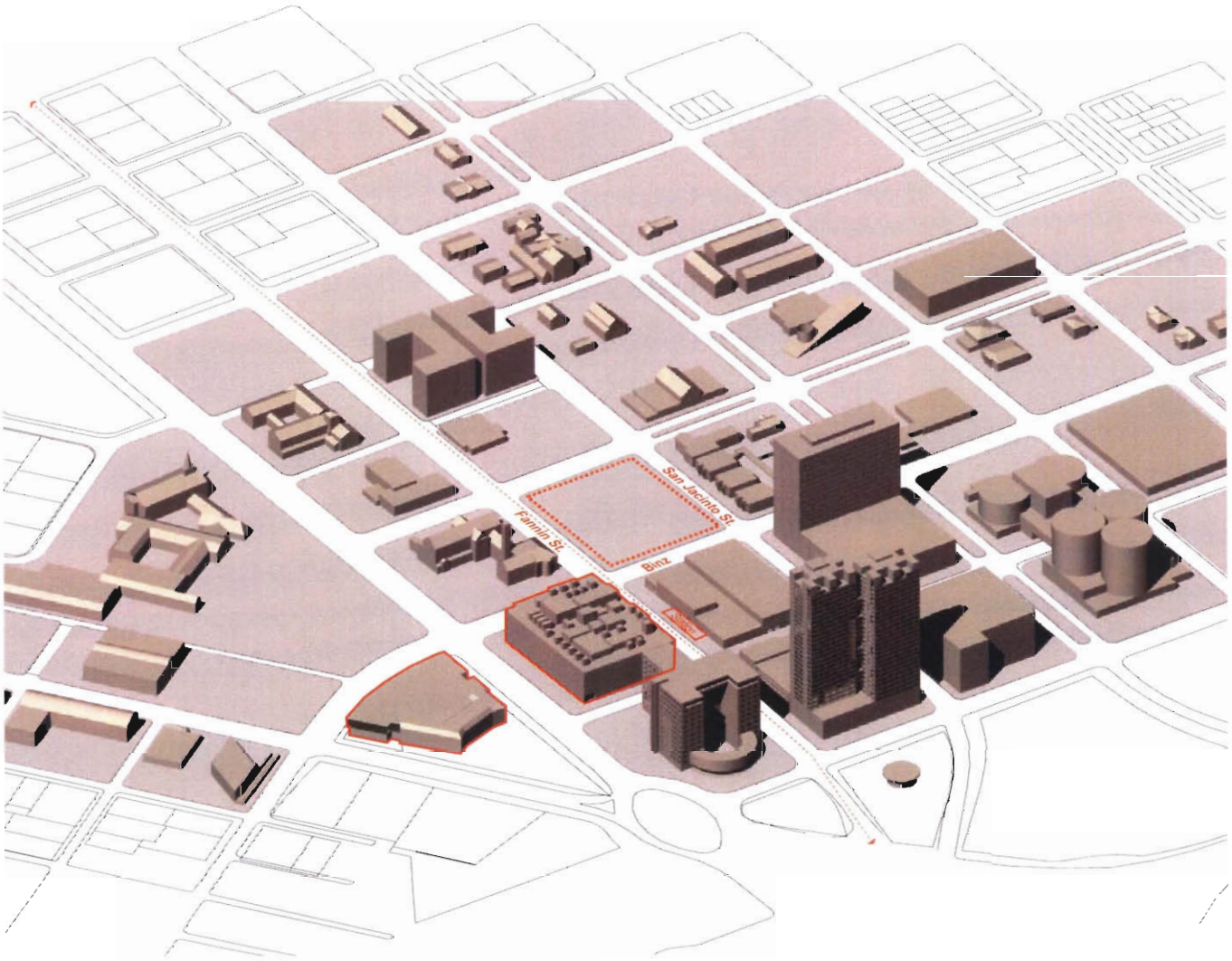
Agile Spatial Constellation: *embedded voids and lobes*



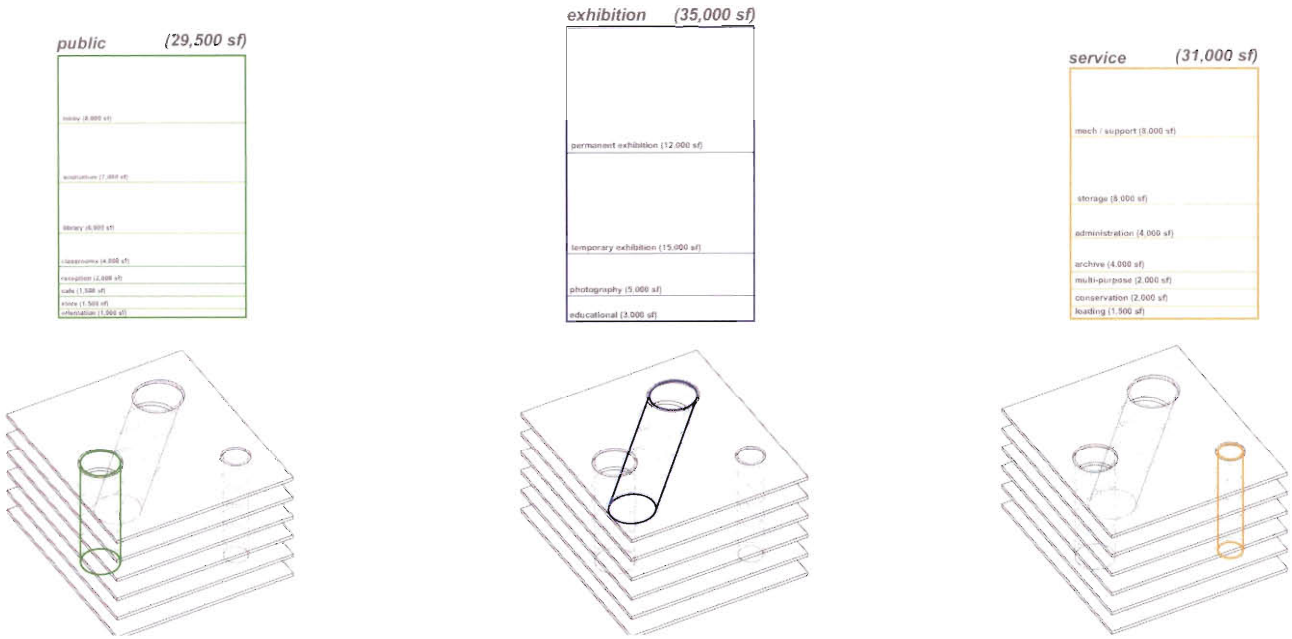
public | **exhibition** | **service**

Program: addition for the Museum of Fine Arts in Houston

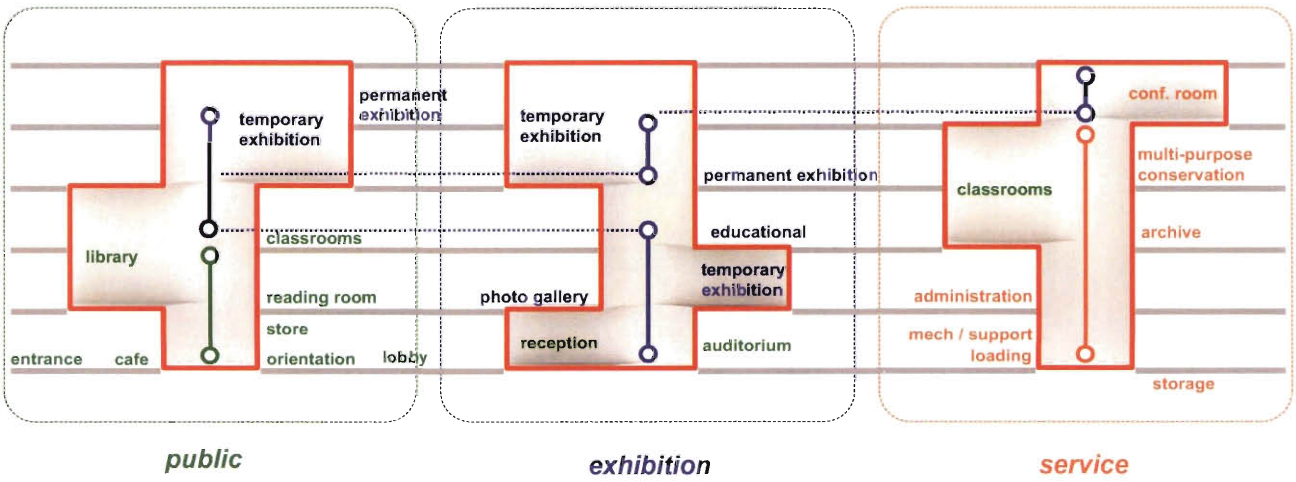
The MFA is currently looking to expand into a third building. The building is to house their contemporary art collection as well as mee their needs for both public and service program in addition to exhibition space.



Site: *Houston Museum District MFA Campus*

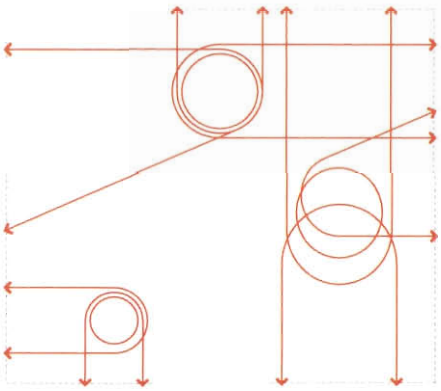


Organization: *Program-Void Affiliations*
By designating each void with a primary affiliation, (public, exhibition, service) programs are given an identity and legibility within the building. These general affiliations are not binding, programs and circulation migrate to other voids- creating opportunities for interaction.

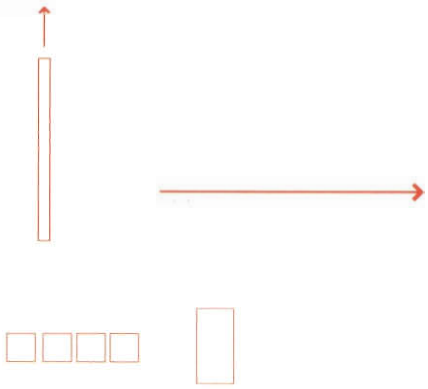


Pinwheel

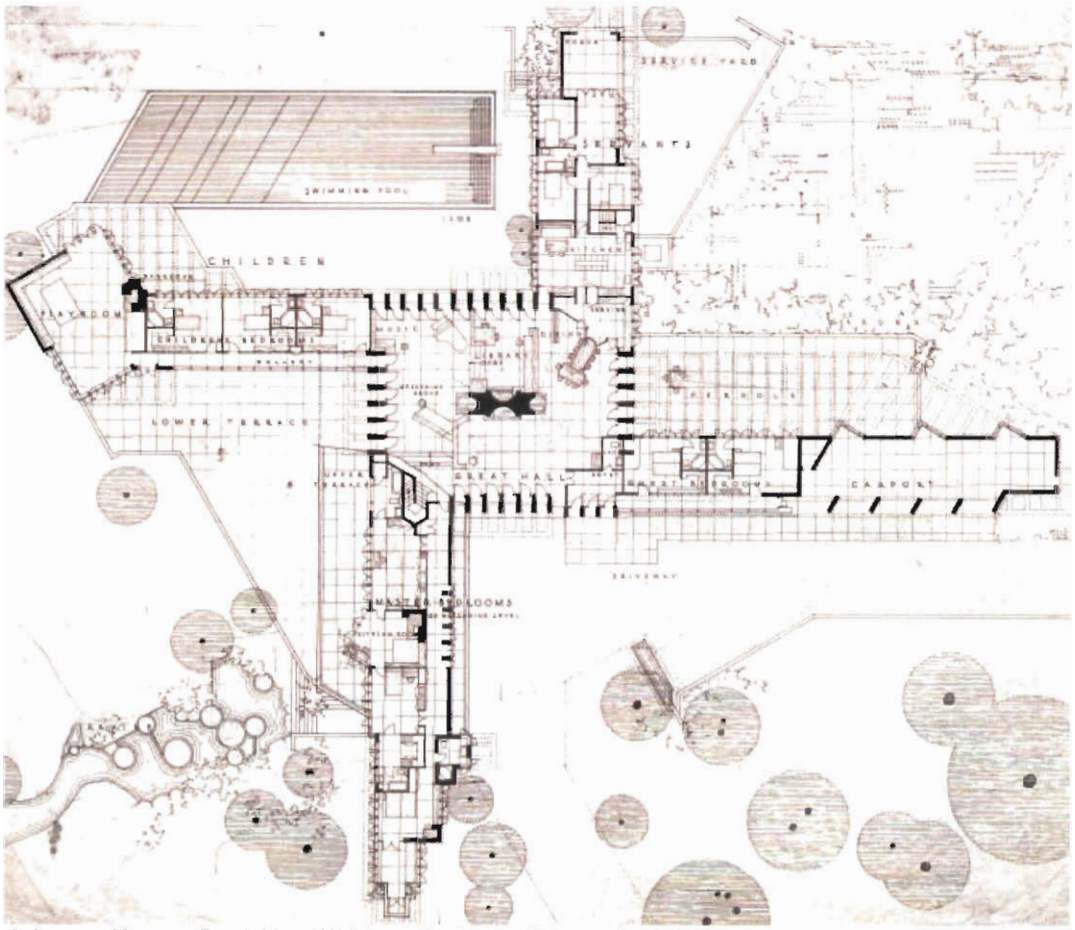
The resulting plan geometry is the generator for new assertions in program and circulation. This plan diagram resonates with the Pinwheel, a modernist technique for expanding the domains of program and circulation.[2] Frank Lloyd Wright's Johnson House, and Mies van der Rohe's Brick Country House are clear examples of this prevailing ambition. But the pinwheel is limited to spatial modulation in plan. The dependence on extending edges and open corners hinges program and circulation on degrees of enclosure – controlled by a dial that clicks onto known settings rather than lighting up new possibilities.[3]



Lobe Geometry:
superimposed in plan

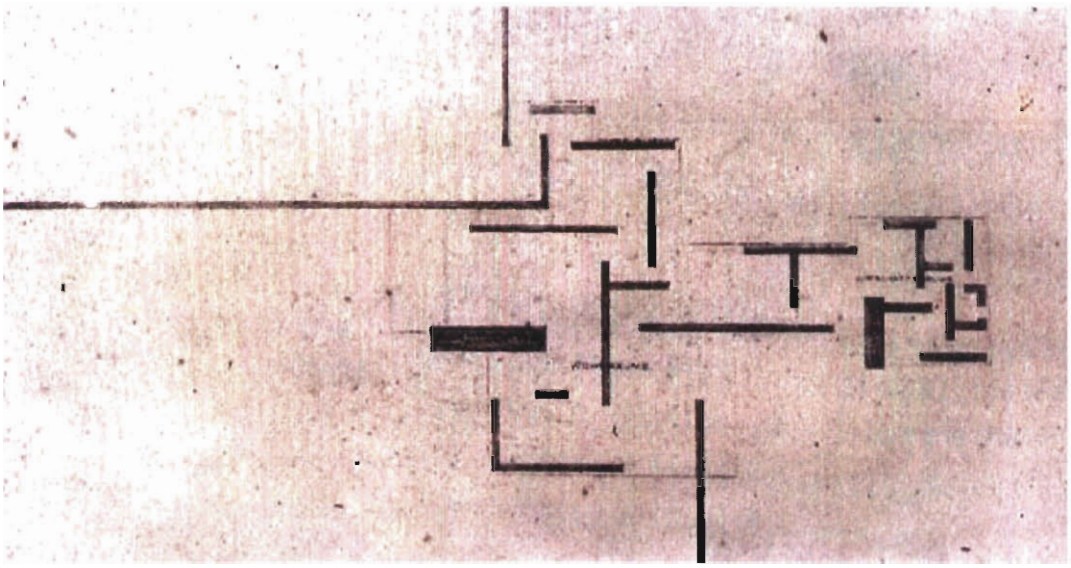


Pinwheel Geometry



Johnson House: *Frank Lloyd Wright - Wind Point, Wisconsin 1937*

Wright's Johnson House in Wind Point, Wisconsin, is a pinwheel of individual plans attached to a single central space. Wright referred to this house as a zoned house, where children's bedrooms, guest bedrooms, mater bedrooms, and servant quarters were all given a separate wing. The wings are co-linear with an edge of the main square. Given this geometric continuity, each wing slips into the central space and extends to claim a band of space within it. The places where the joints occur between spaces become the most interesting parts of the house, as the wings register bumps into the central space.



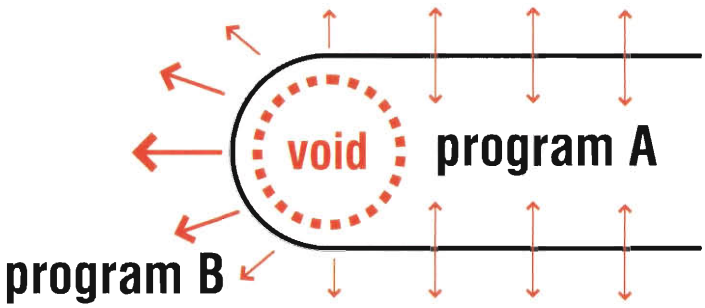
Brick Country House *Mies van der Rohe - 1923*

Mies's un-built Brick Country House is a pinwheel of walls organized around multiple centers. Whereas the Johnson house organized the main programs around a single center, the Brick Country House organized each main program as a center. More important however, is the shift from a pinwheel of separate plans to a pinwheel of walls. Whereas the impact of Wright's technique was limited to the joining areas, Mies's technique is apparent everywhere. By opening up every corner and extending walls beyond these openings, Mies explodes the cellular plan.

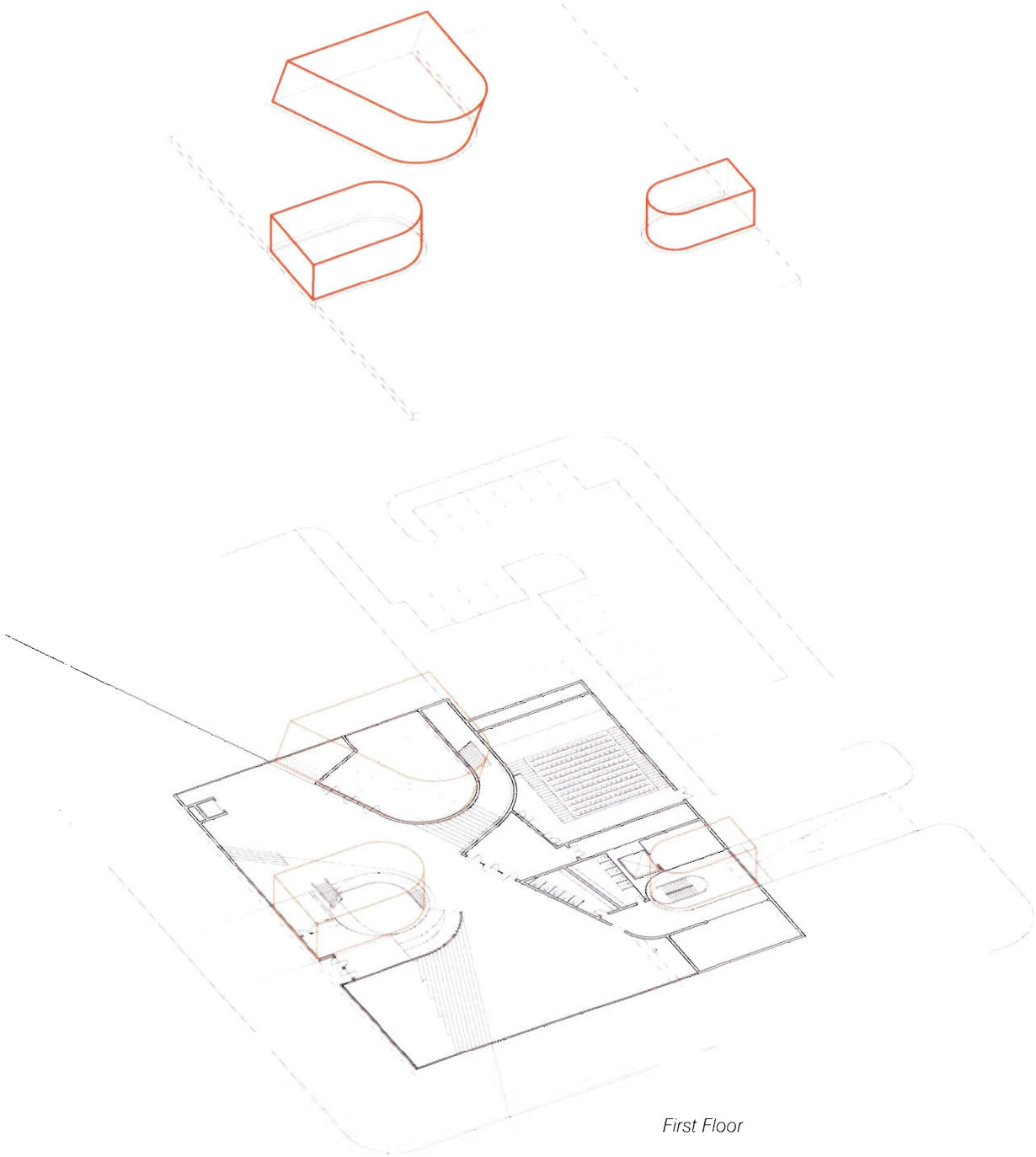
Program: Void Off Center

In the plans, the lobe geometry is used to create pivoting programmatic domains. The changing orientations of the lobes on each floor create unique organizations on each floor. Consequently, programmatic continuities are no longer constrained to typical building divisions such as floors or wings, but pivot freely along the axis of each void. In the interplay between the voids, this tight interlock between various programs supports the wide-ranging goals of museum education and outreach, creating the possibility for visual and physical exchanges between programs.

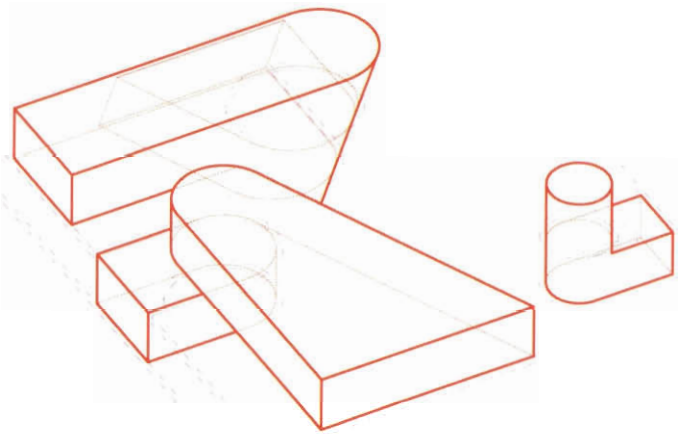
On each floor the lobe geometry creates a percolating hierarchy of programs. The highlighted lobes house the programs that require legibility such as the library or a temporary exhibition gallery. Through the use of tangents and offsets from the void, these programmatic domains ripple across the plans. Small programmatic elements such as stairs, narrow galleries, and service areas are absorbed along the edges while extending and intersecting lines claim larger domains.

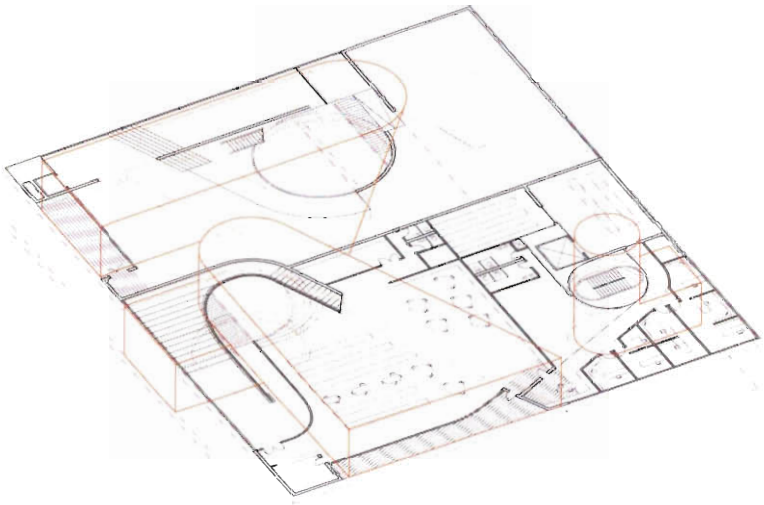


Partial Loops: *Programmatic Interactions*
programmatic interactions are controlled by revising the pinwheel concept as partial loops around voids. This creates different spatial effects around the loop. As the neutral straight edge of the lobe curves to wrap around the void, it becomes charged to repel space. As a result, space around the loop can be characterized as more conducive or less conducive to interaction.

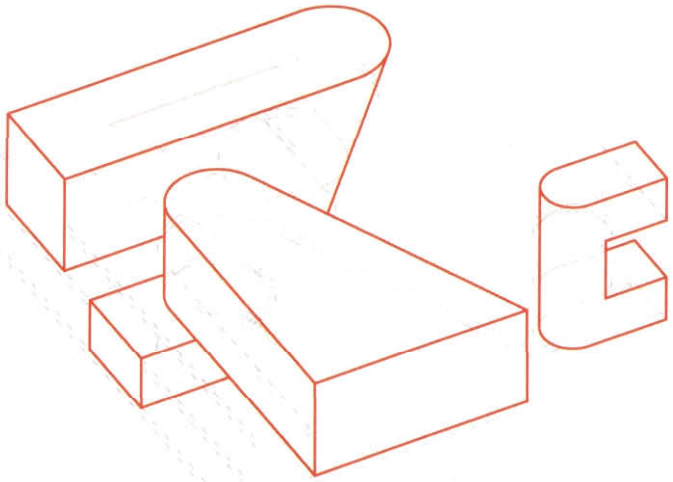


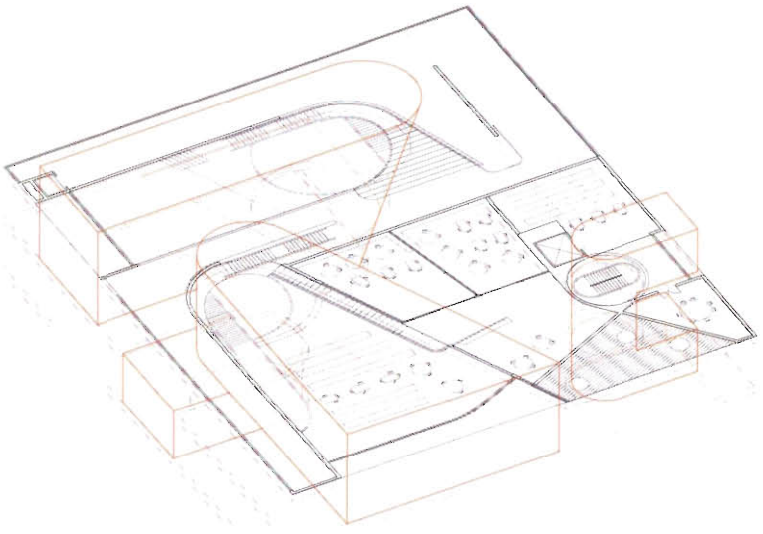
First Floor



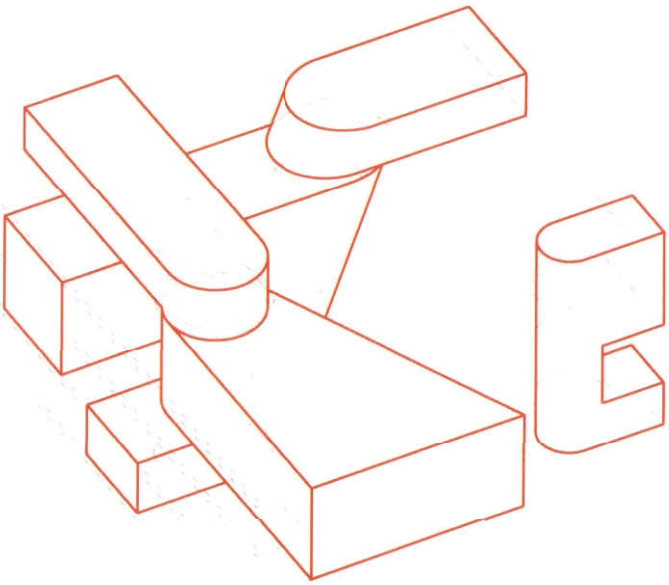


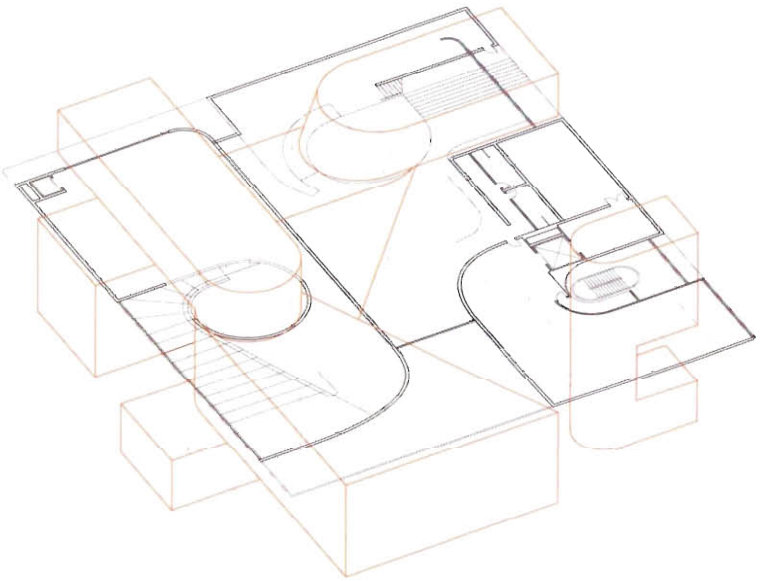
SecondFloor



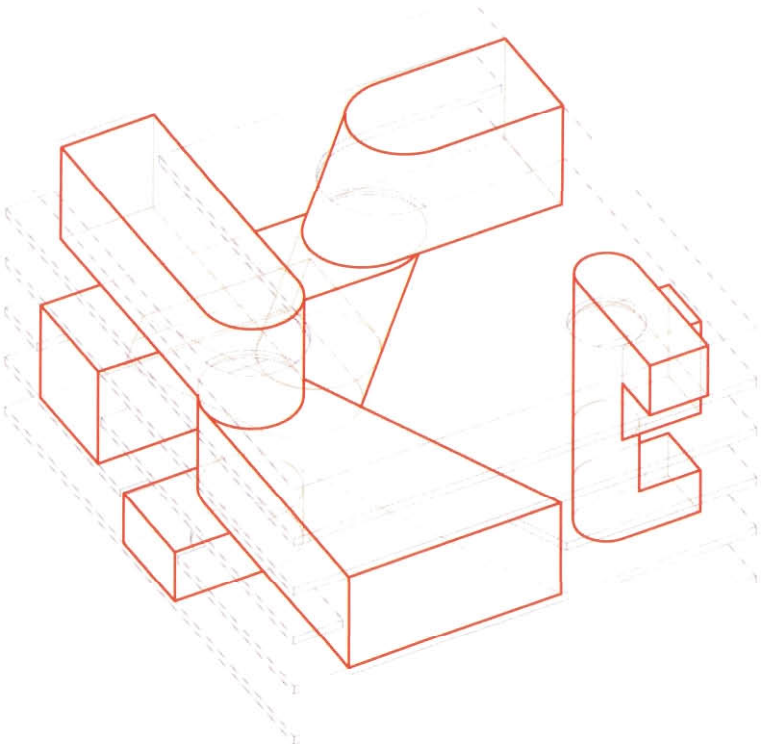


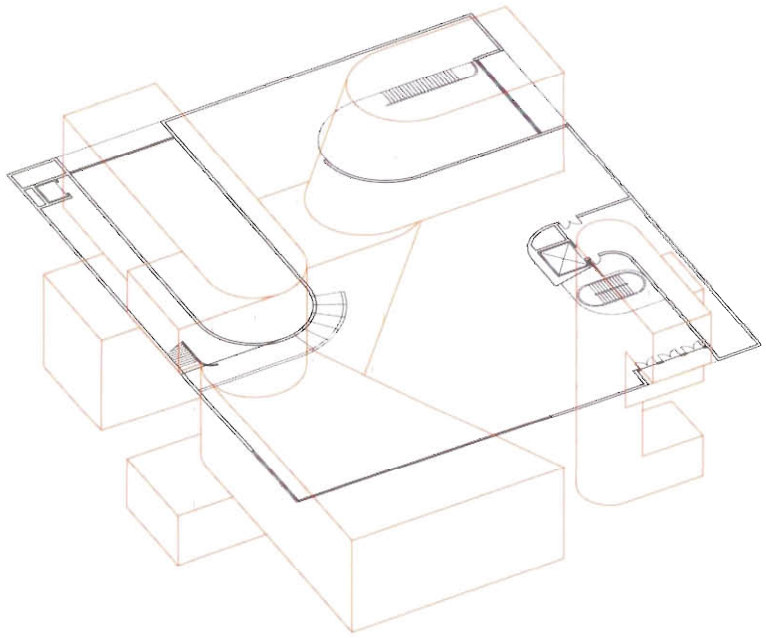
Third Floor



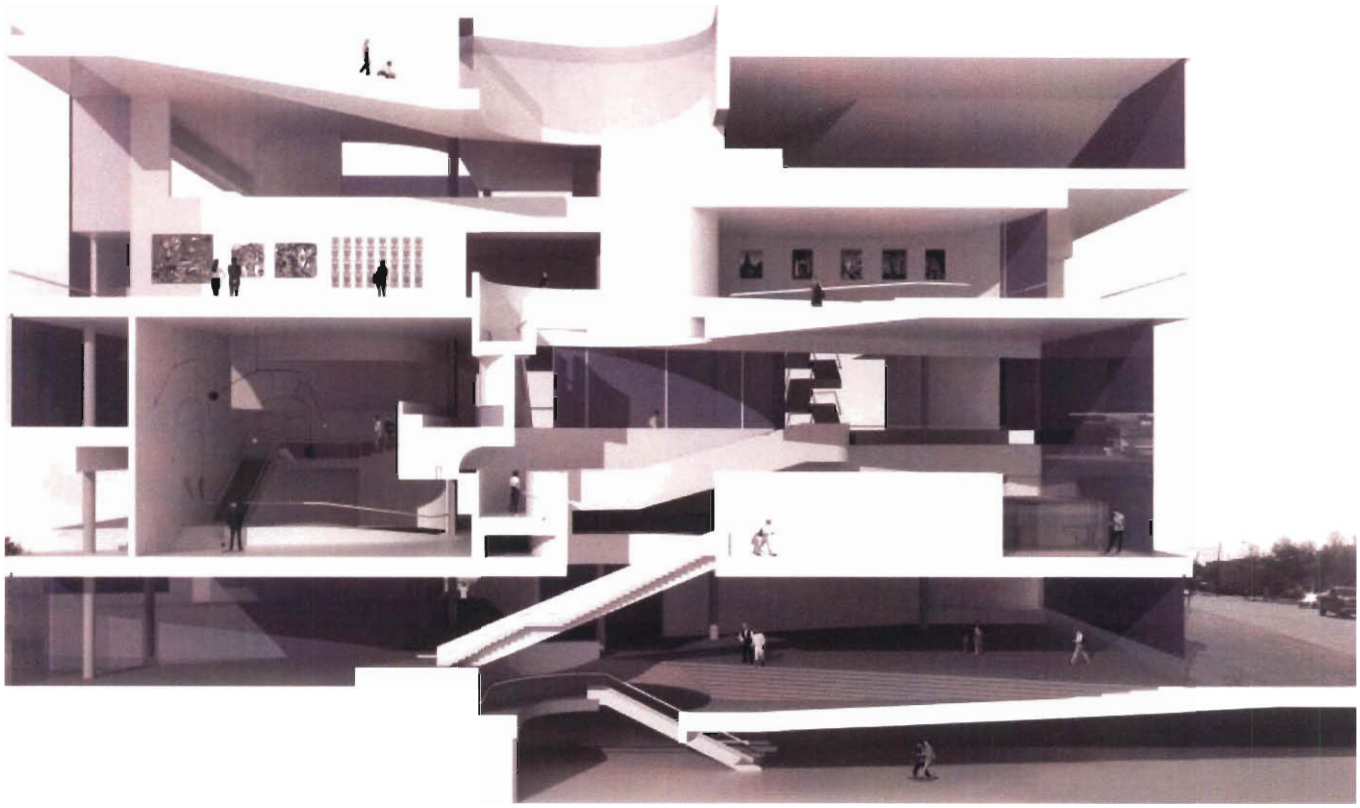


Fourth Floor

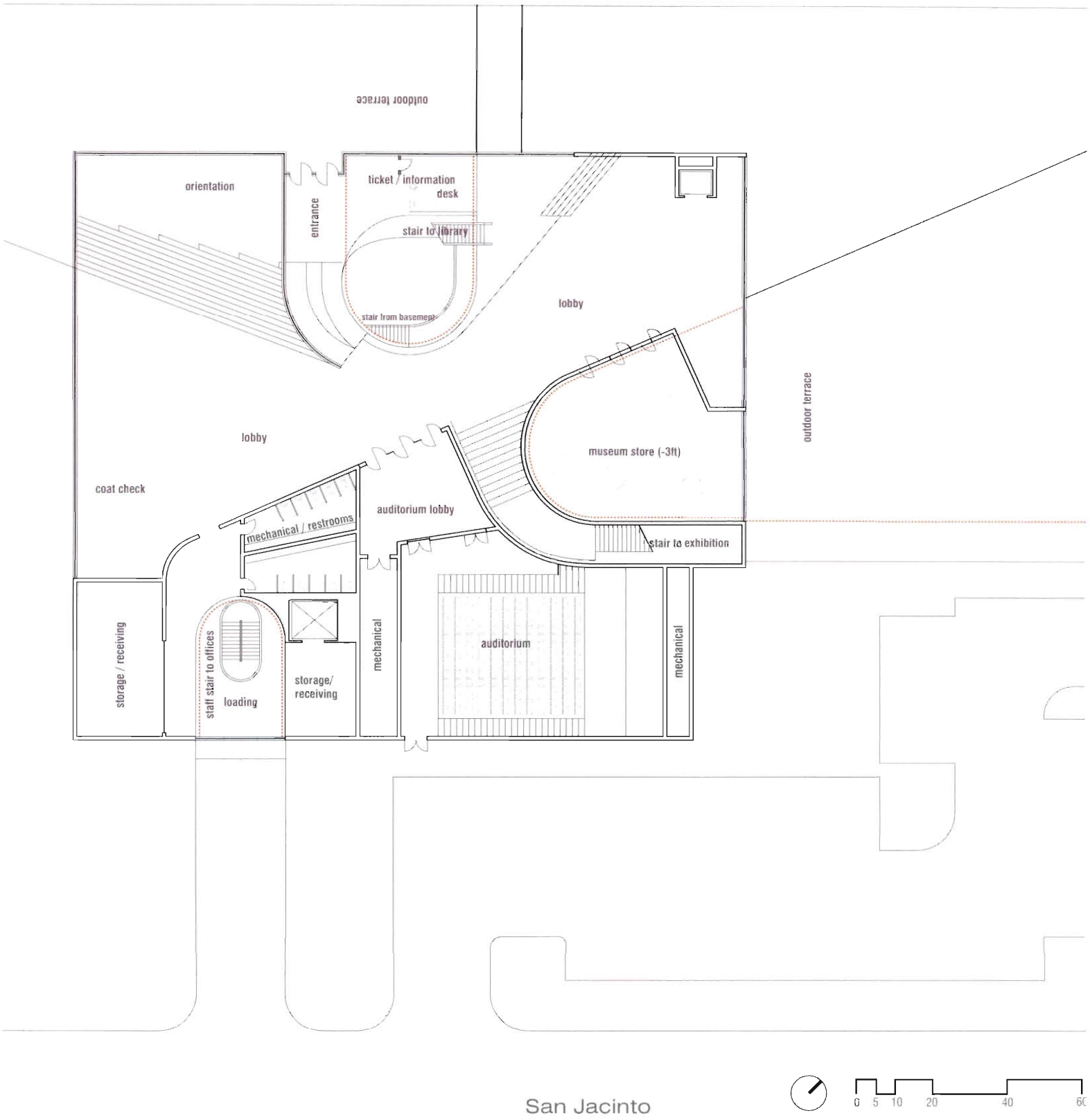




Fifth Floor



Section Perspective: *pivoting lobes - interlocking programs*


Fannin
outdoor terrace
orientation
entrance
ticket / information desk
stair to library
stair from basement
lobby
outdoor terrace
lobby
coat check
mechanical / restrooms
auditorium lobby
museum store (-3ft)
stair to exhibition
storage / receiving
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loading
storage/ receiving
mechanical
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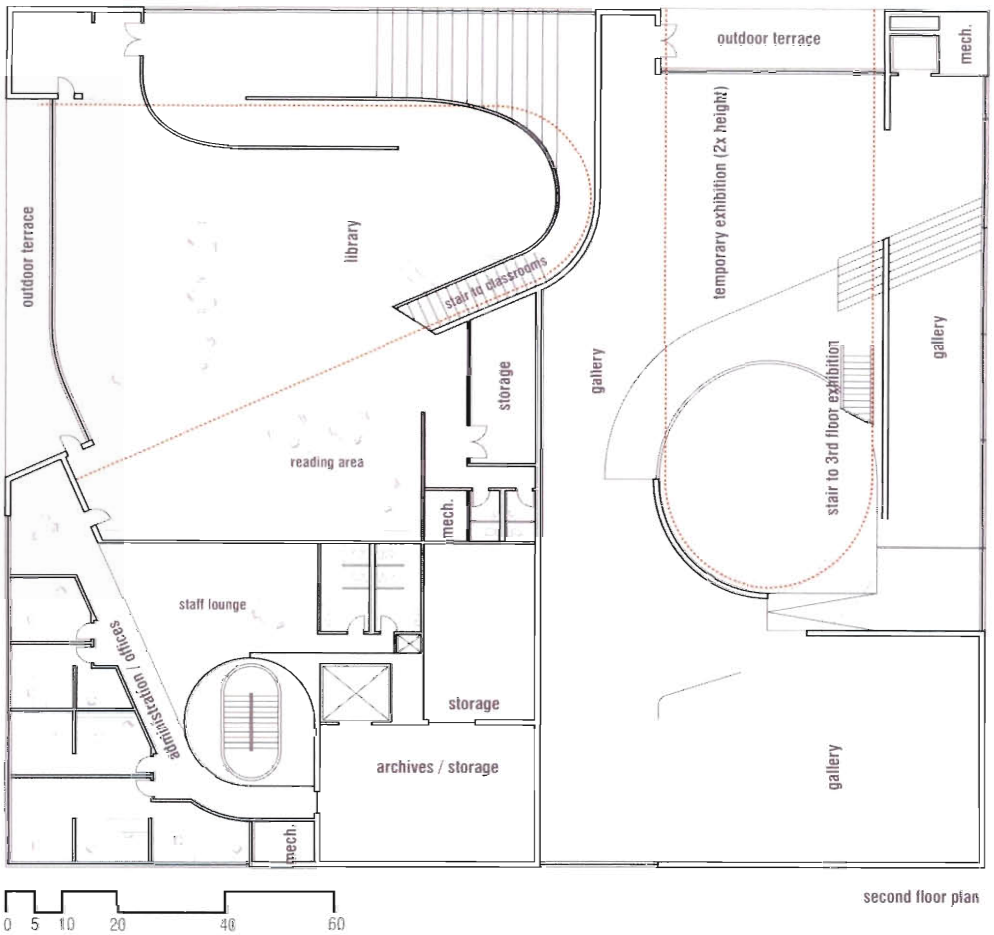
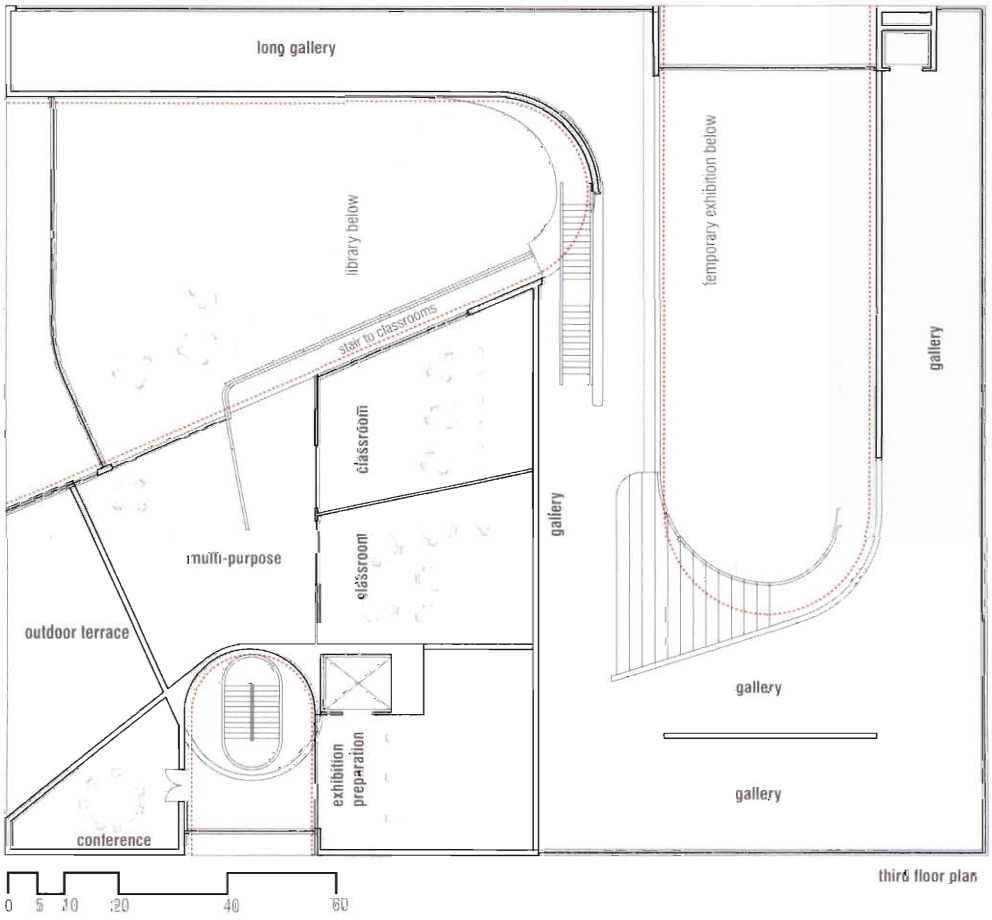
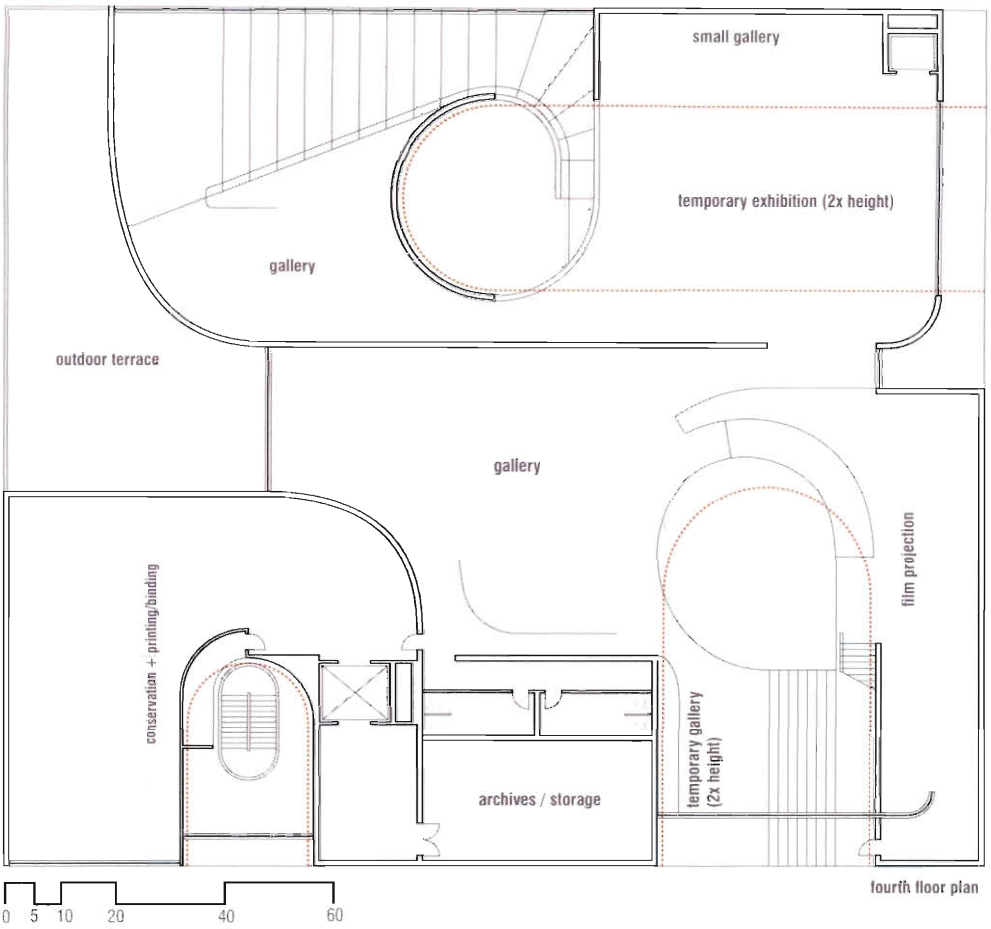


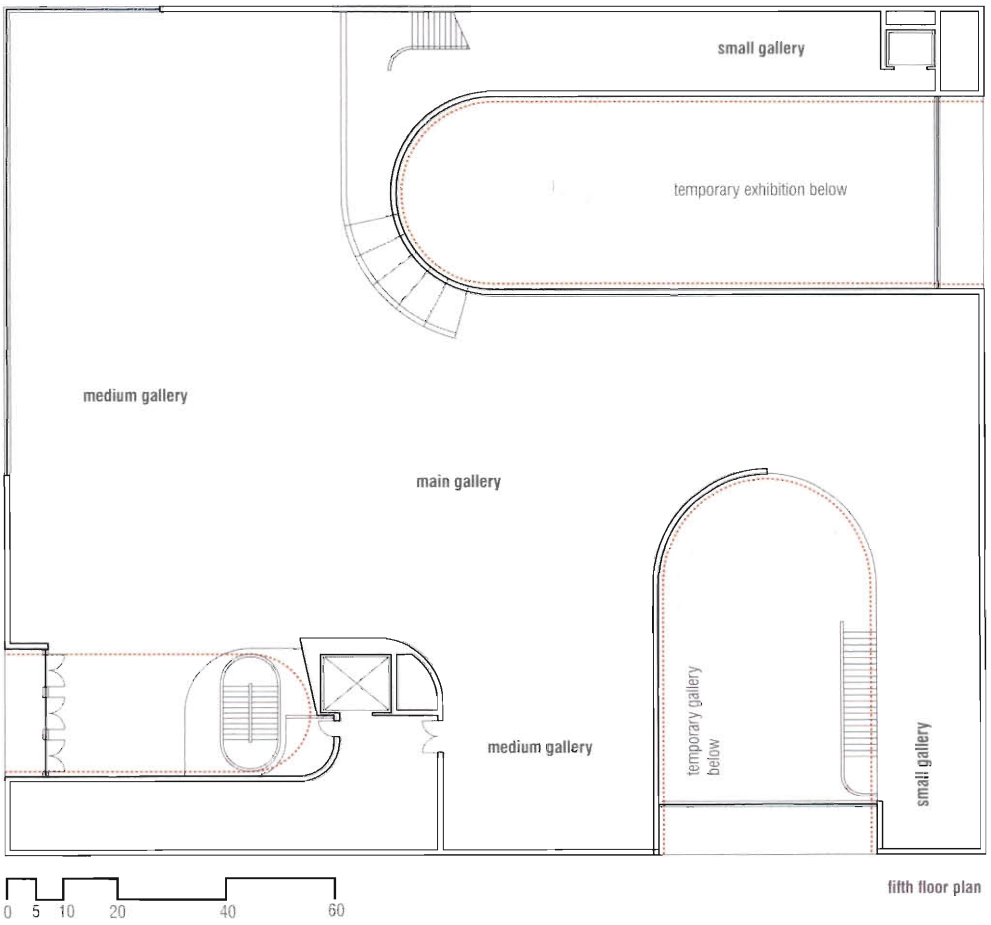
second floor plan



third floor plan



fourth floor plan

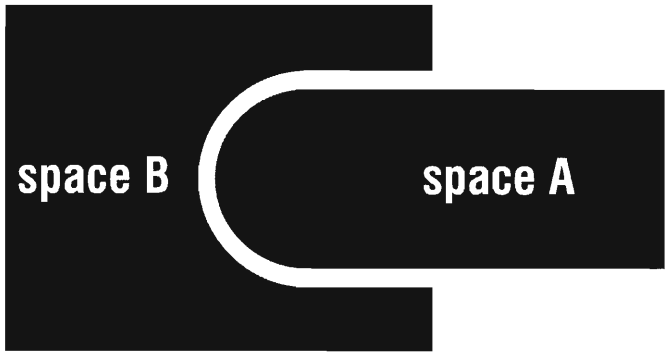


fifth floor plan

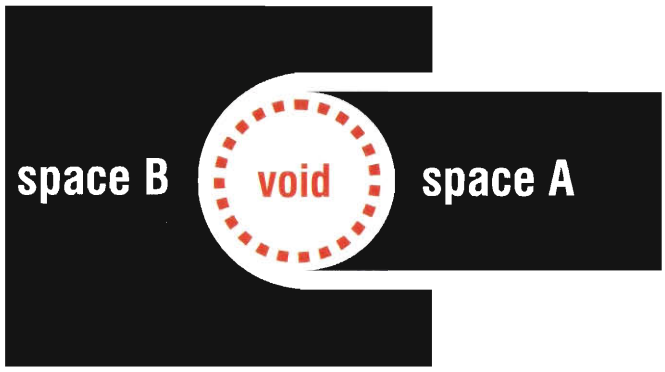
Interrupted Interlock

The Pinwheel creates programmatic interactions with spatial interlocks – rooms that share defining edges and extend into each other.[4] Void Off Center further exploits this spatial concept by introducing the void as an interruption to this relationship. Whereas the mutual dependence between spaces in the pinwheel forces uniformities across spaces, the interruption created by the void allows new freedoms within spaces. The void relieves spatial codependence while maintaining a continuous, locked geometry.

By pushing two spaces apart, the void breaks the concurrence between visual and physical connections. In other words, unlike the pinwheel, a view into another space is no longer aligned with the path to get there. In Void Off Center, this separation is leveraged to amplify views while controlling physical access. The exhibition lobe on the second floor for instance, fosters an array of criss-crossing, recessive, and diagonal views around and beyond the void. But access to the gallery on the other side or on the floor above is targeted around the void's edge, revealing little of the space ahead. Programs retain identities of function and legibility while entangled in a dynamic visual field.



Conventional Interlock



Interrupted Interlock

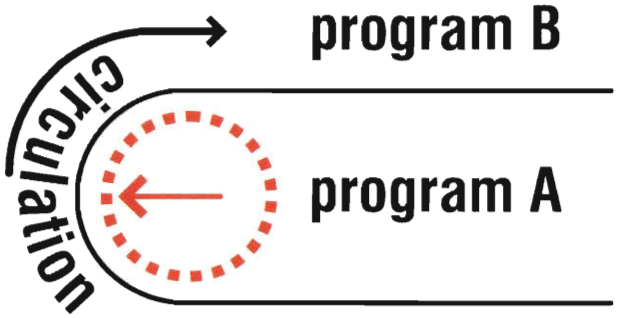
Interrupted Interlock: *temporary exhibition lobe - second floor*
The exhibition lobe on the second floor fosters an array of criss-crossing, recessive, and diagonal views around and beyond the void, yet access to the gallery on the other side or on the floor above are targeted around the void's edge, revealing little of the space ahead. Programs retain identities of function and legibility while entangled in a dynamic visual field.

Interrupted Interlock: *galleries around exhibition lobe - third floor*

Circulation: Void Off Center

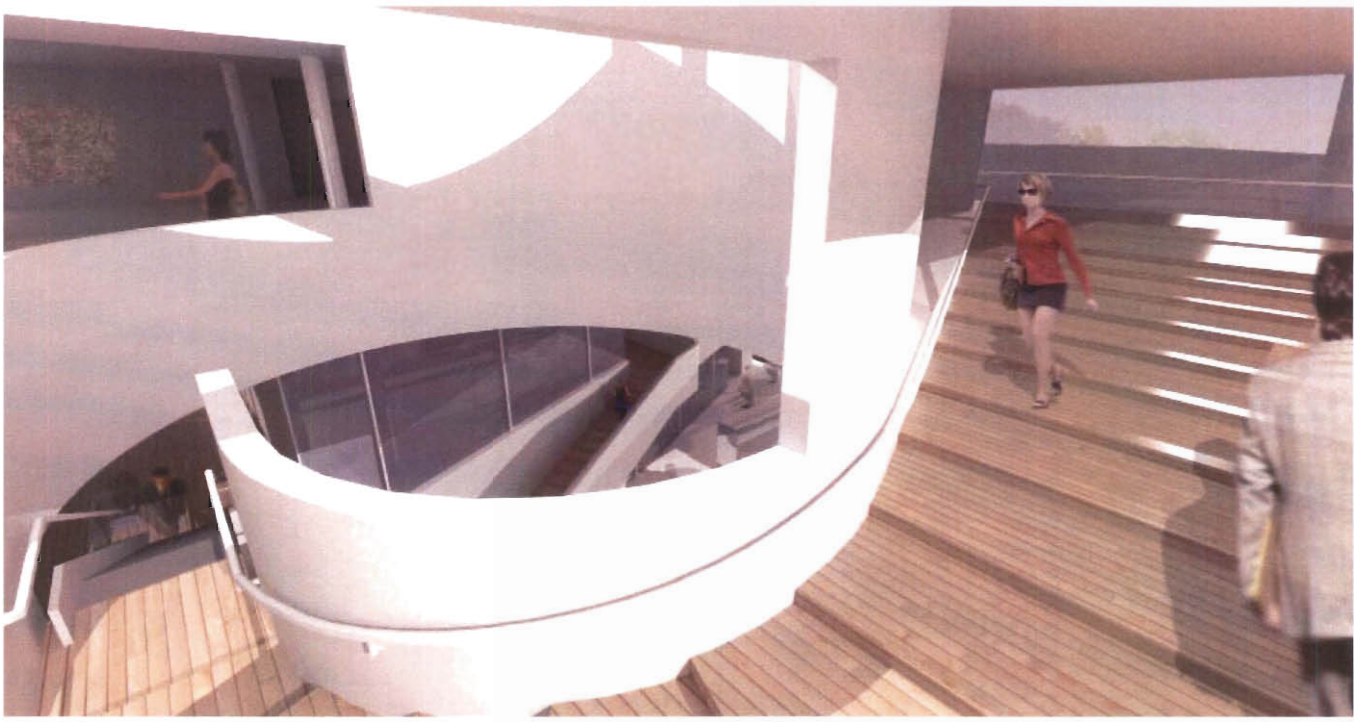
Possibilities for circulation are created by the relationship between the void, program (lobe), and path. In this setup, the void disengages the path, separating it from adherence to program. This detachment introduces an opportunistic window when circulation can change course. With slight adjustments like a derailleur, the void sets circulation on new trajectories that alter its form and direction.[5]


circulation
void
program

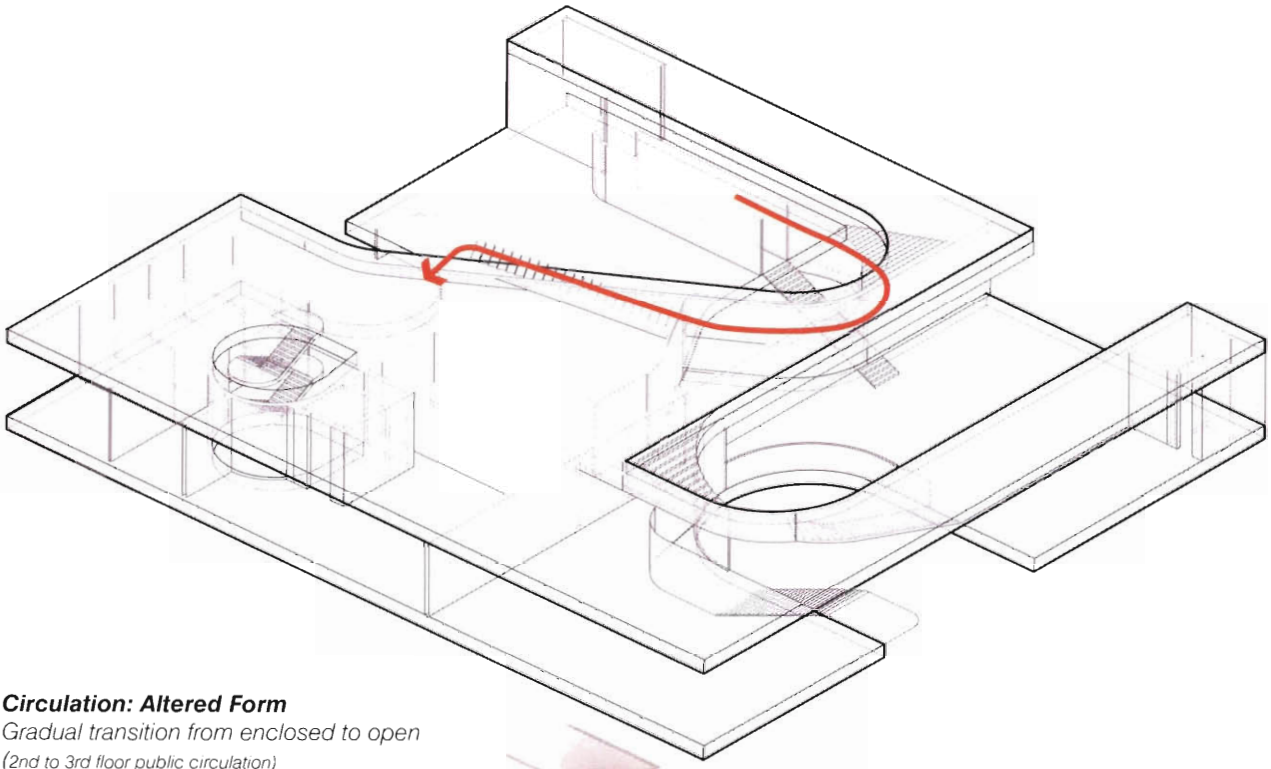

program B
circulation
program A

Multiple/Inflected Views

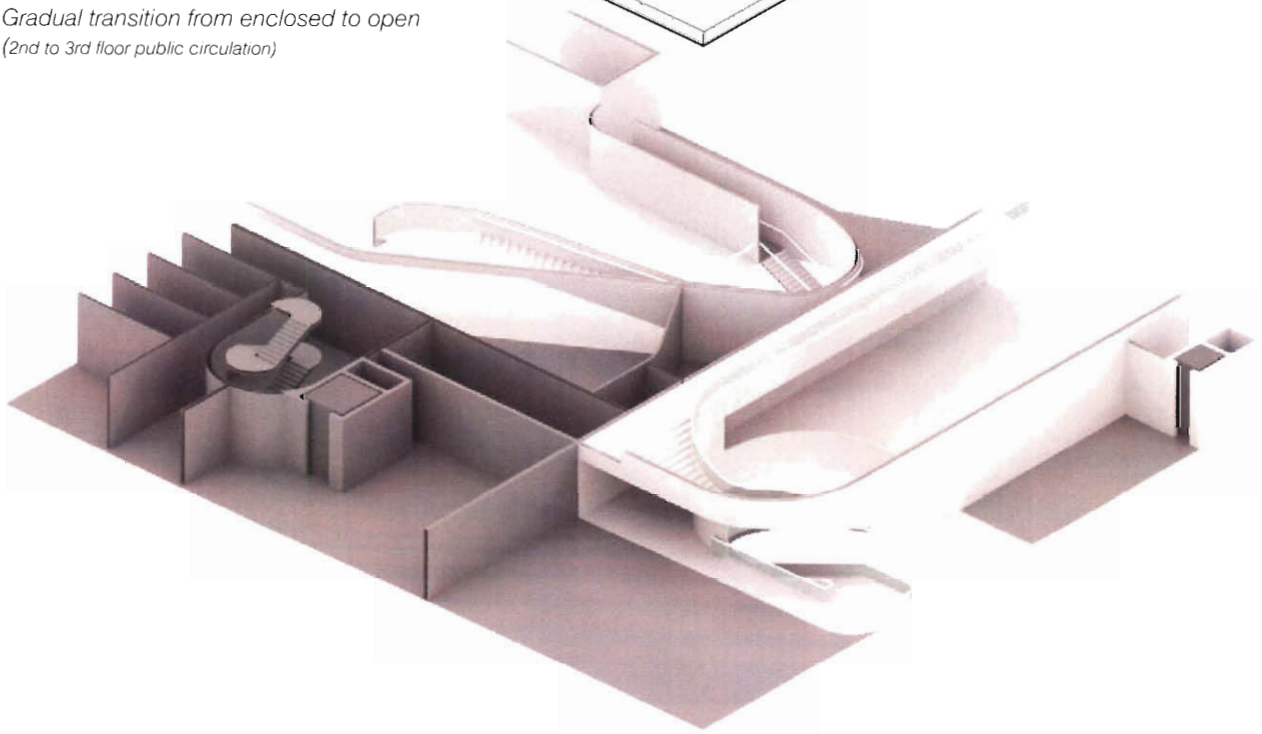
Circulation is also directed through multiple views staged around the voids. The swirling vantage point at the top of the stairs on the fourth floor, for example, offers various interior views. 1) One can look back down the stairs to where one came from. 2) Look forward, over the steps that lead towards the outdoor patio. 3) Look directly across, to the gallery. 4) Look down, for an unexpected view into the library. In addition to drawing direct connections from certain points, these views inflect around the void to create implied circulation paths. Orbits of form and material bend sight lines as the eye follows the path of an edge as it is carried from a hand-rail, to a floor material, to a wall. These implied continuities encourage the eye to extrapolate across what it cannot see, stirring up the anticipation of what is to come.

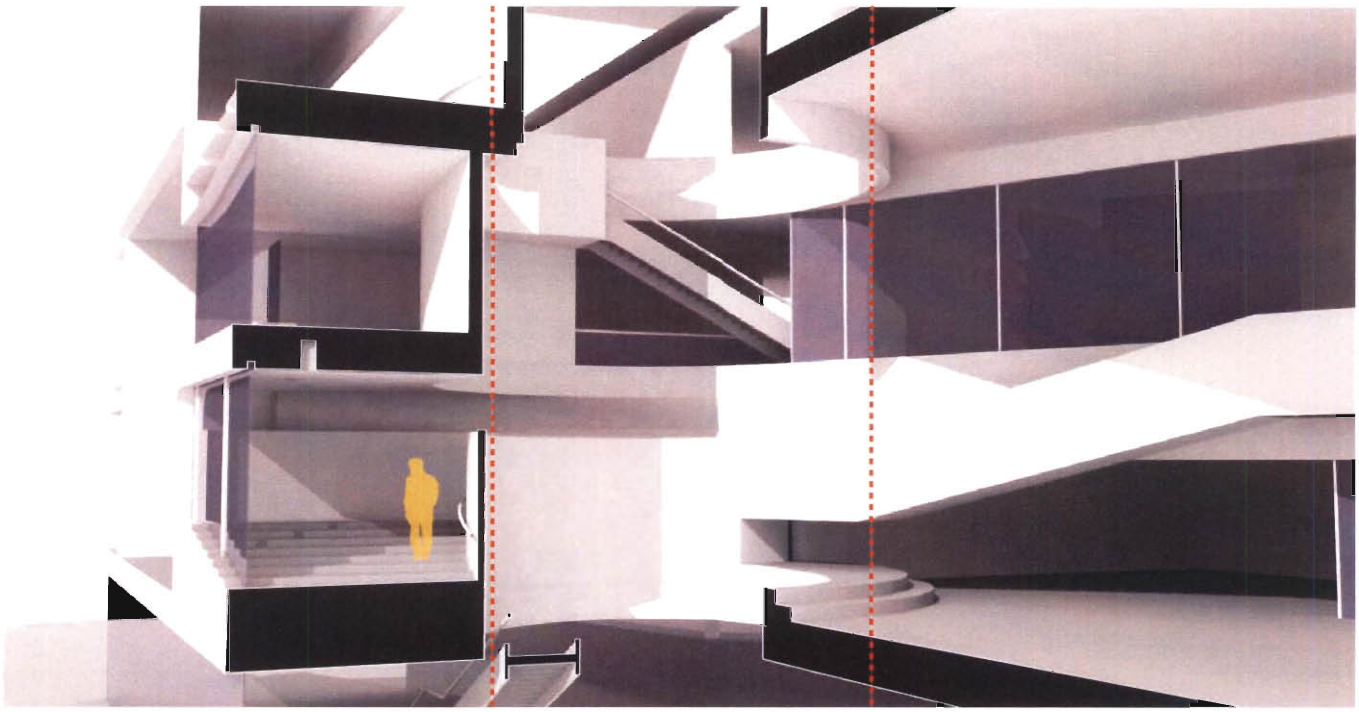


Swirling Vantage Point: *circulation directed by multiple views*
1) back down the stairs to where one came from. 2) forward, over the steps that lead towards the outdoor patio. 3) across, to the gallery. 4) down, for an unexpected view into the library.



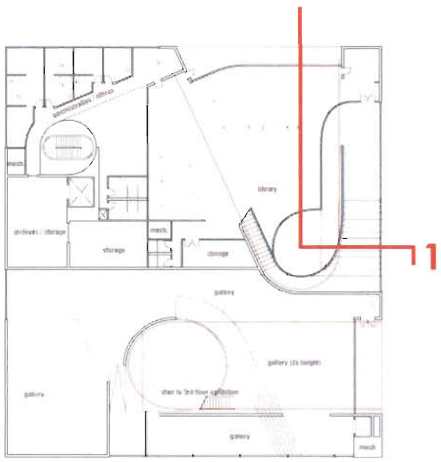
Circulation: Altered Form
Gradual transition from enclosed to open
(2nd to 3rd floor public circulation)

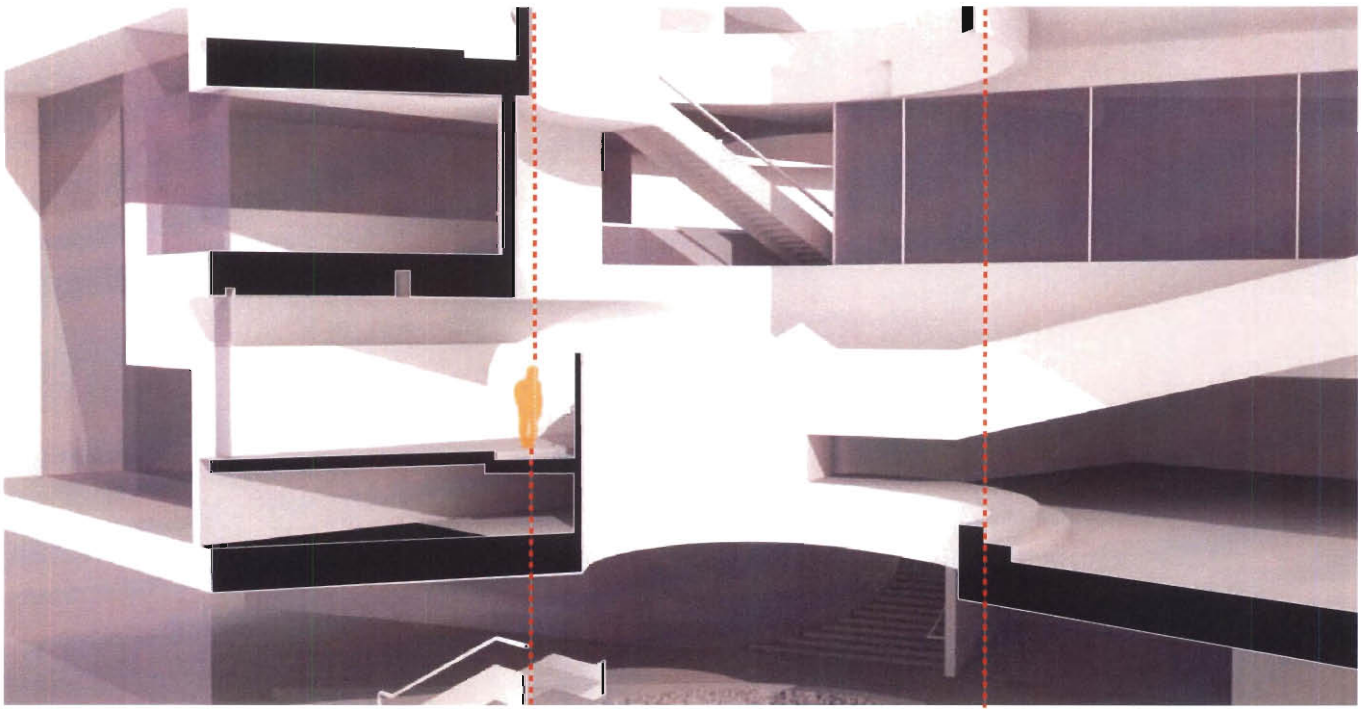




Approach

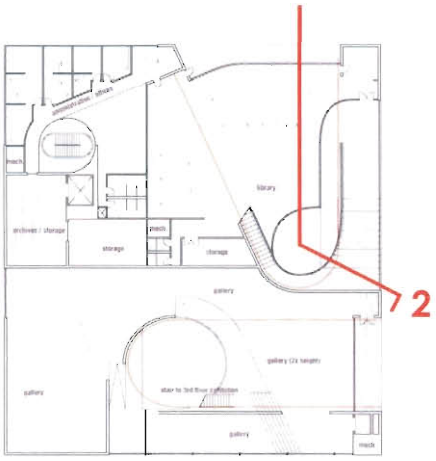
In the first phase, circulation is outside the void. The subject's attention is directed away from the interior as a continuous view of the outside tracks along the outer edge.

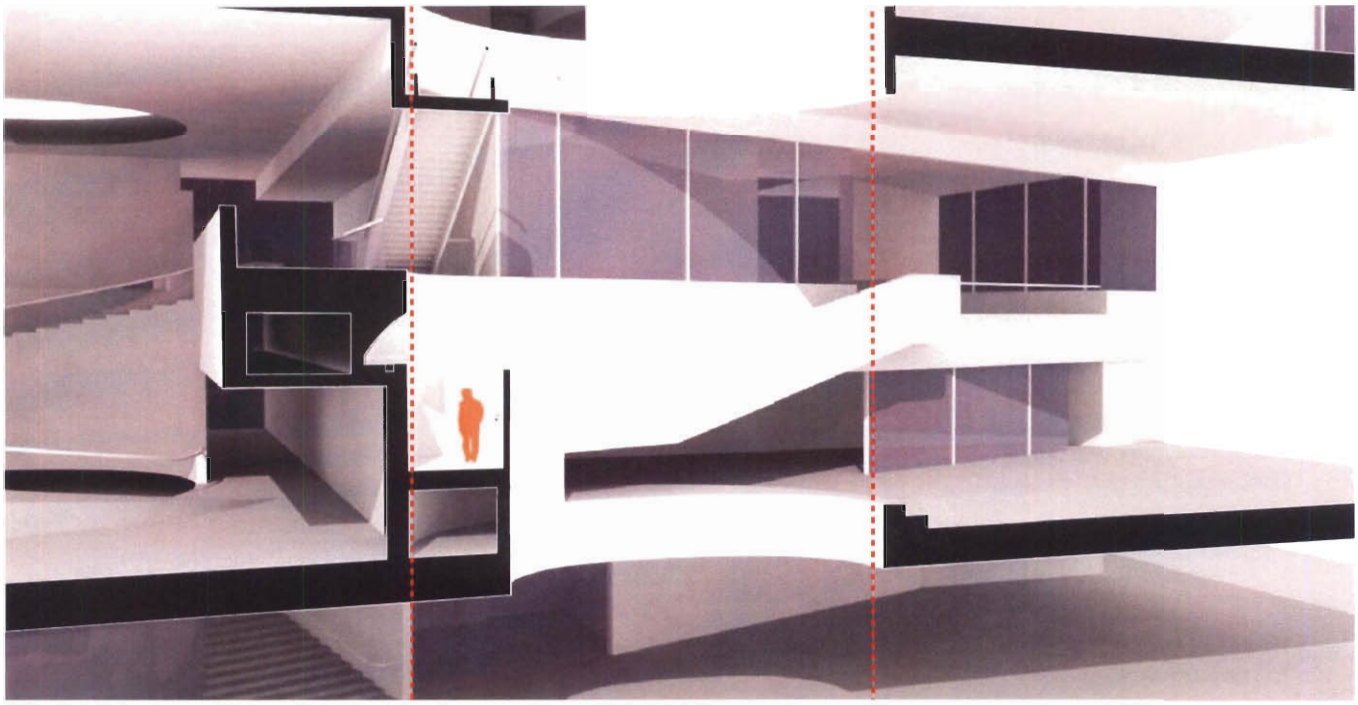




Threshold

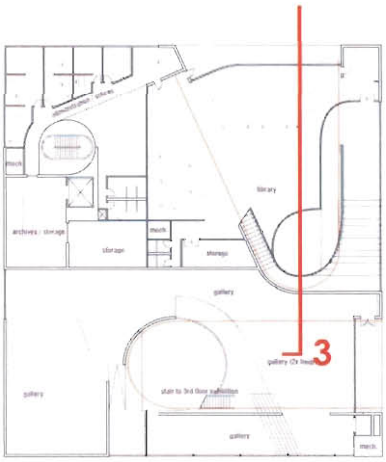
Circulation slips in and crosses the threshold of the void. The inner wall curves into the void and introduces a lateral shift. The subject is re-oriented and pulled inward by a swerve in the path. The height of the space is gradually compressed as a broad stair rises four feet to a landing. The visible down lights are replaced by soft up lights nestled out of sight, along the edge.

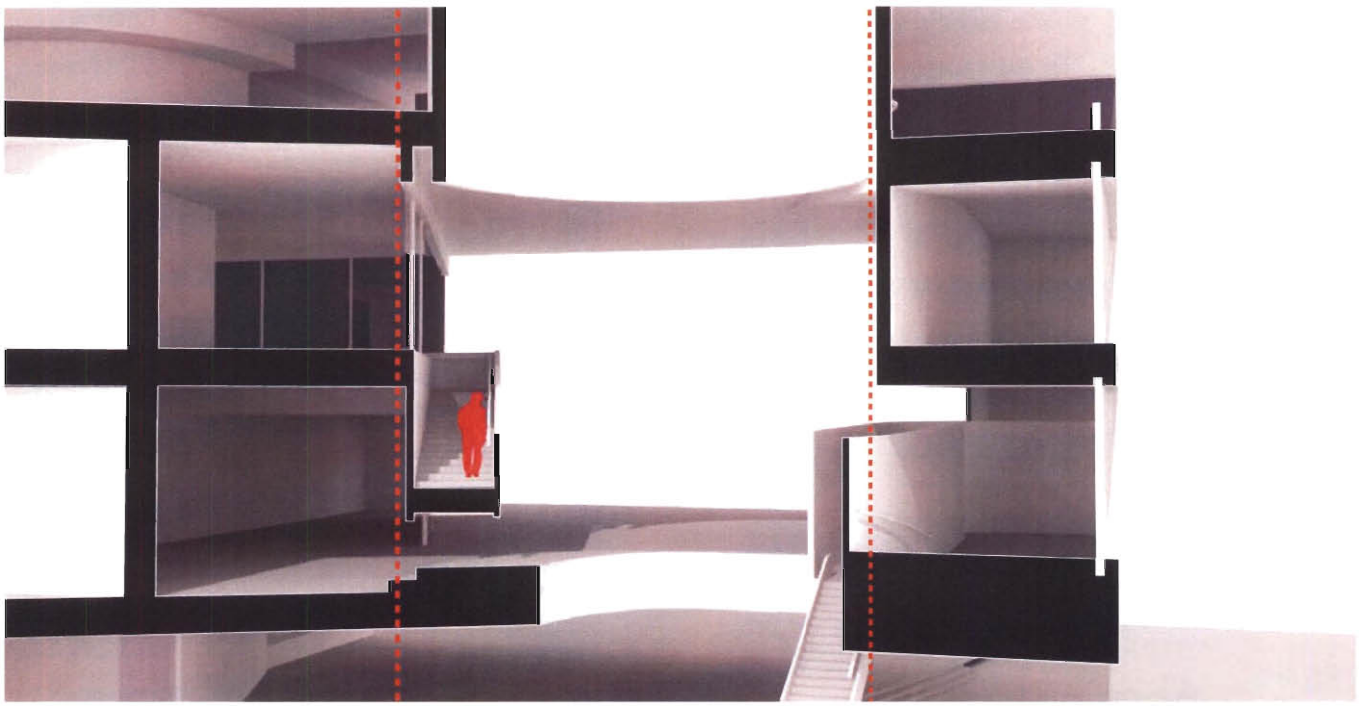




In

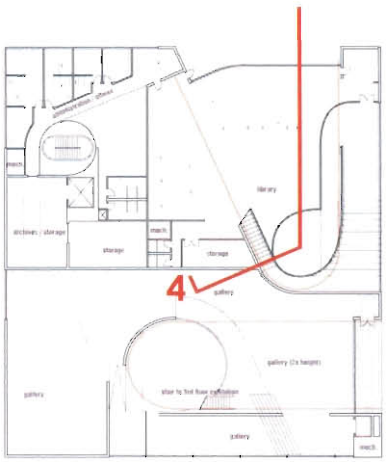
In this phase, circulation is fully in the void. At this moment, the path is tightly wound around the void, and the visual access to the space ahead is compressed to just a few feet. But for the subject, the uncertainty beyond the bend is balanced by the understanding of what is happening above, as views into gallery spaces and classrooms appear overhead.

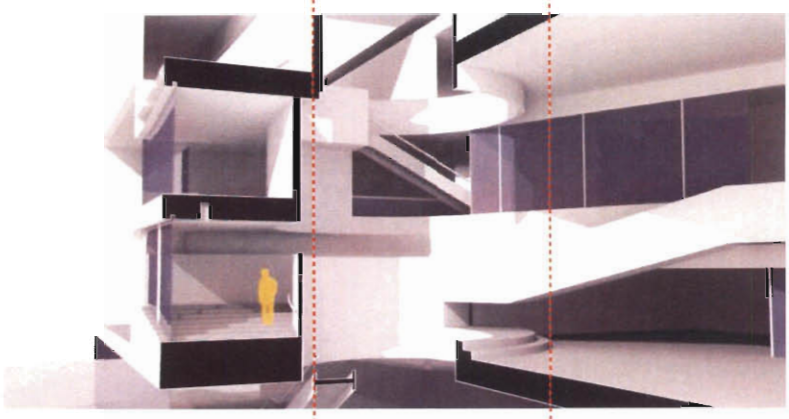


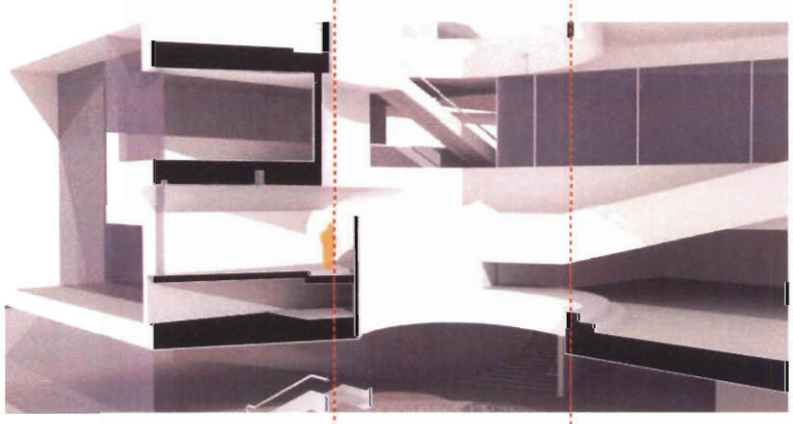


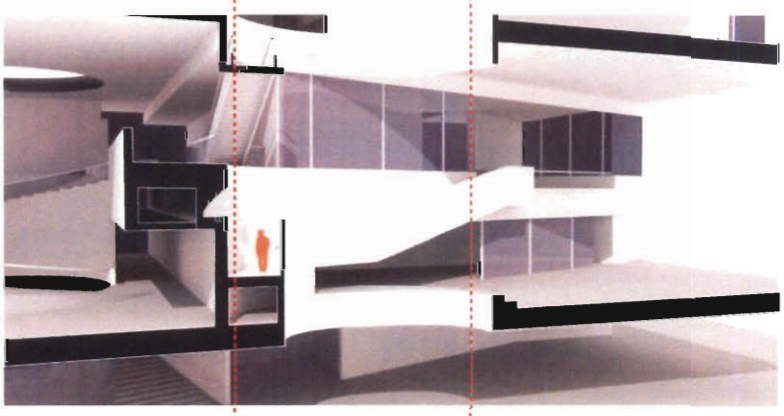
Out

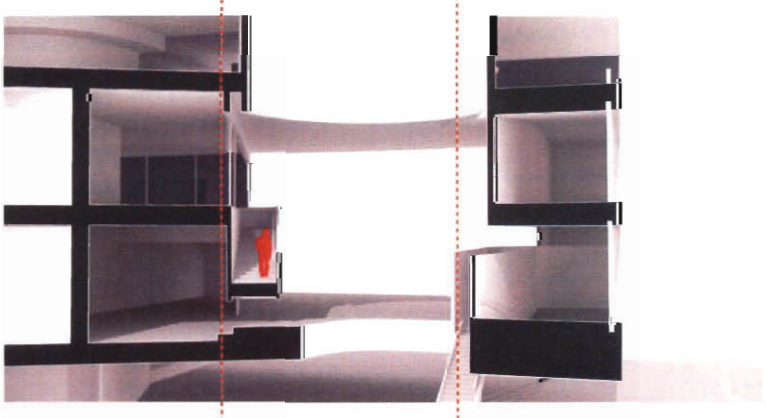
In this phase, circulation exits the void. Its path continues along the inside edge of the lobe (library) and eventually peels off into the classrooms. Here another shift occurs where the stair begins before the rise of the partial wall that surrounds it. This shift allows each riser to gradually elevate the subject's sight line

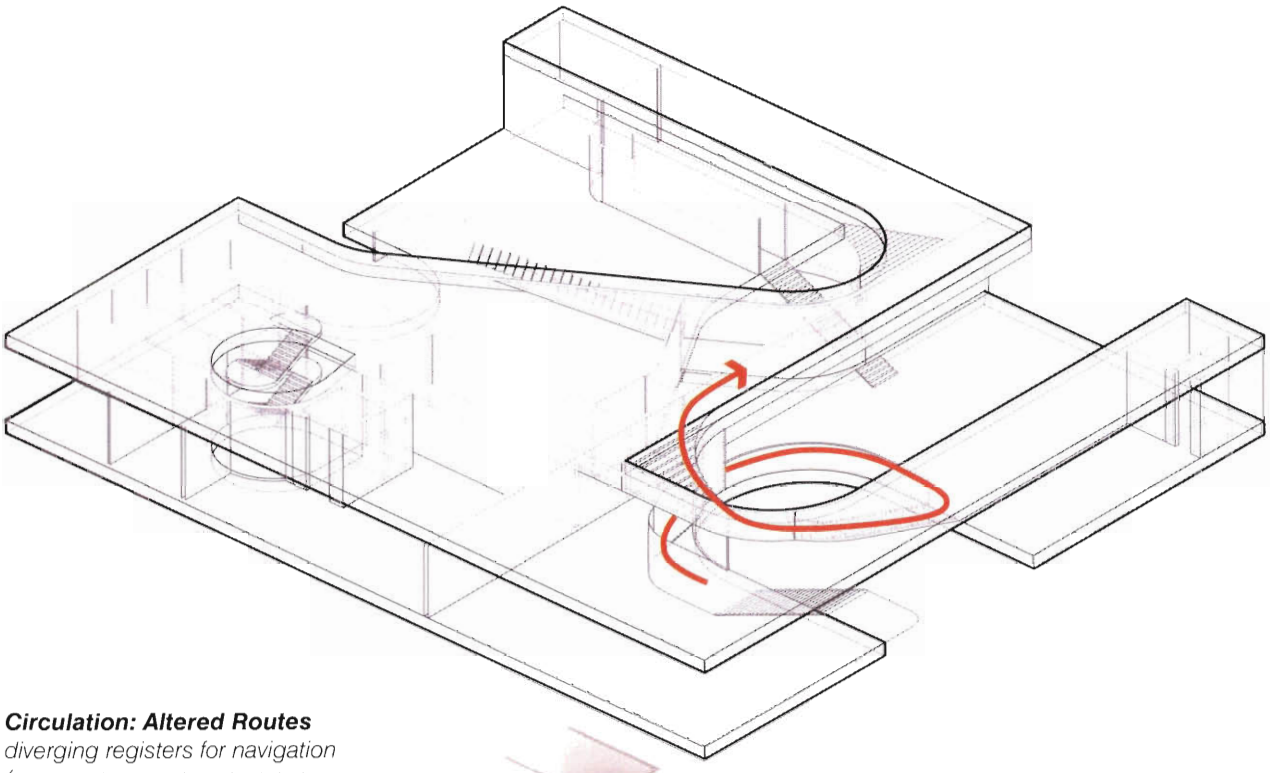




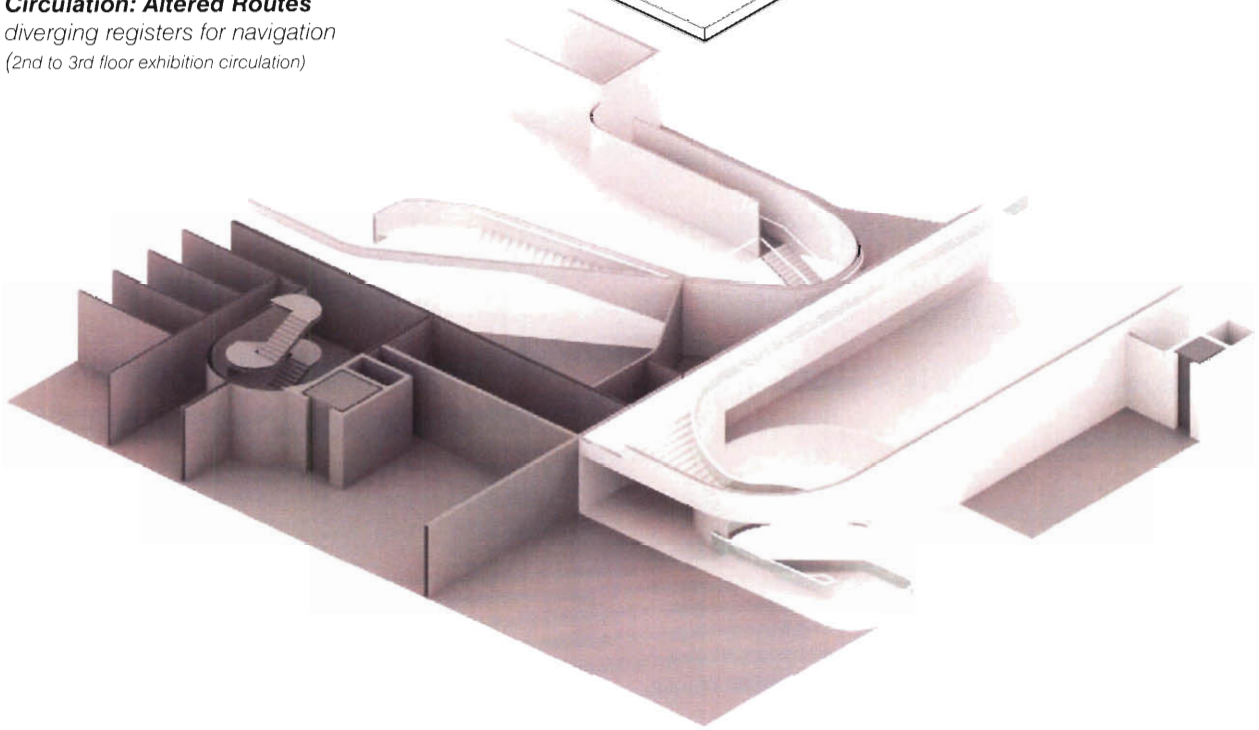


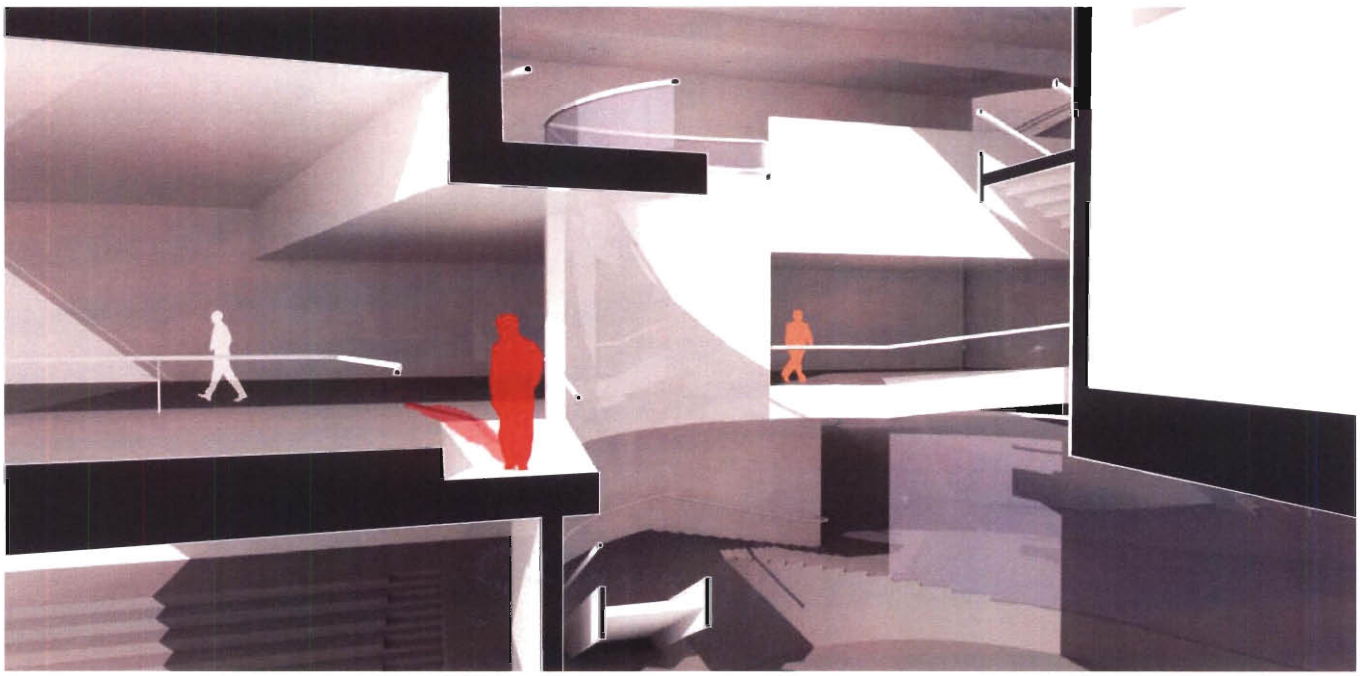






Circulation: Altered Routes
diverging registers for navigation
(2nd to 3rd floor exhibition circulation)





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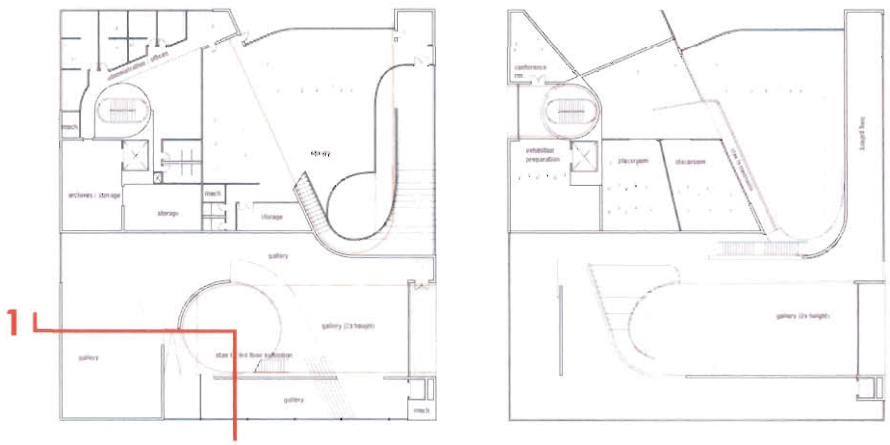
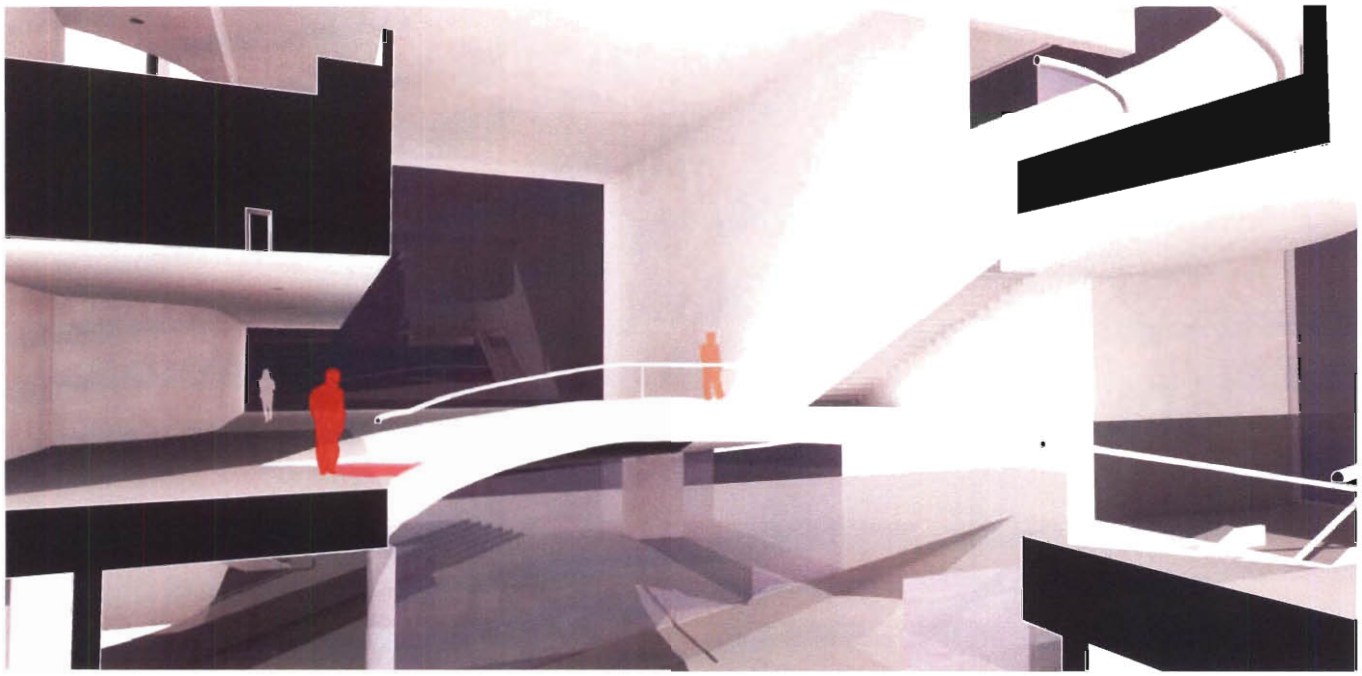
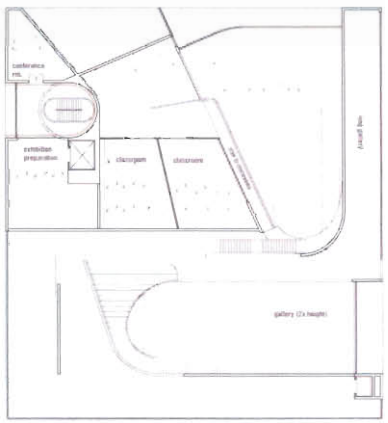
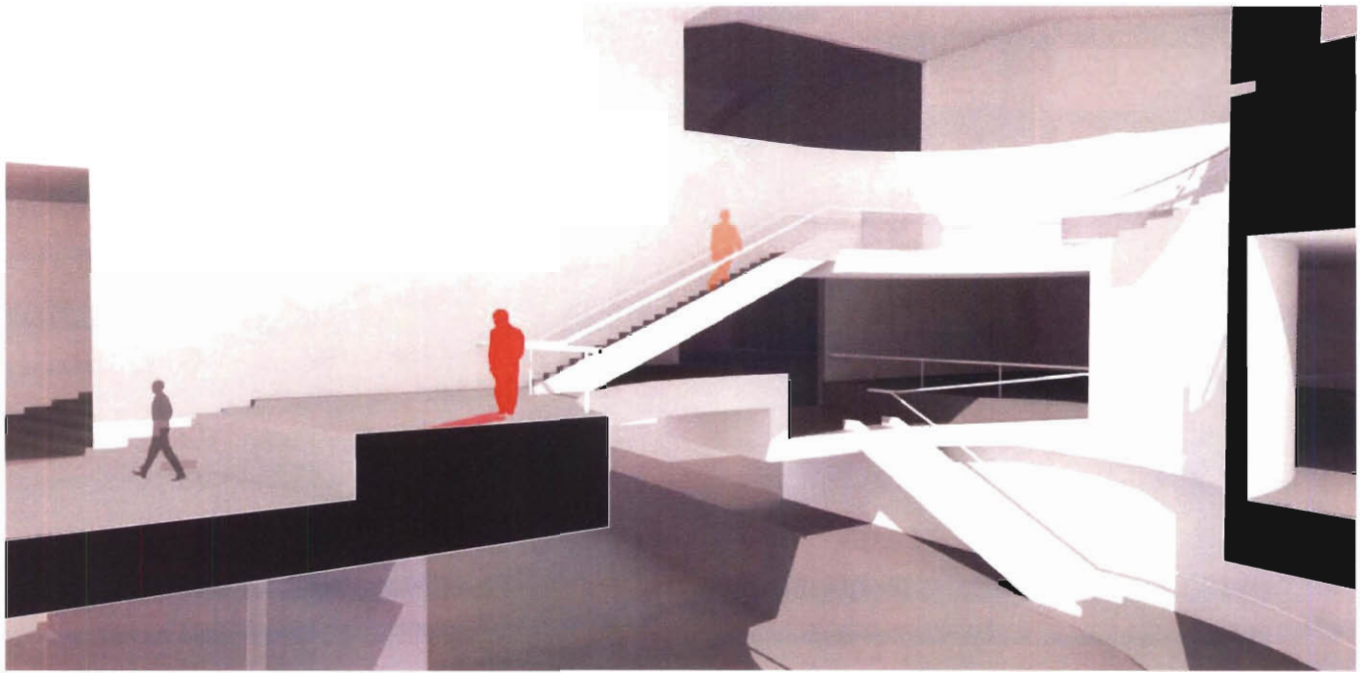




2


2
library
gallery
gallery (2x height)
gallery
gallery

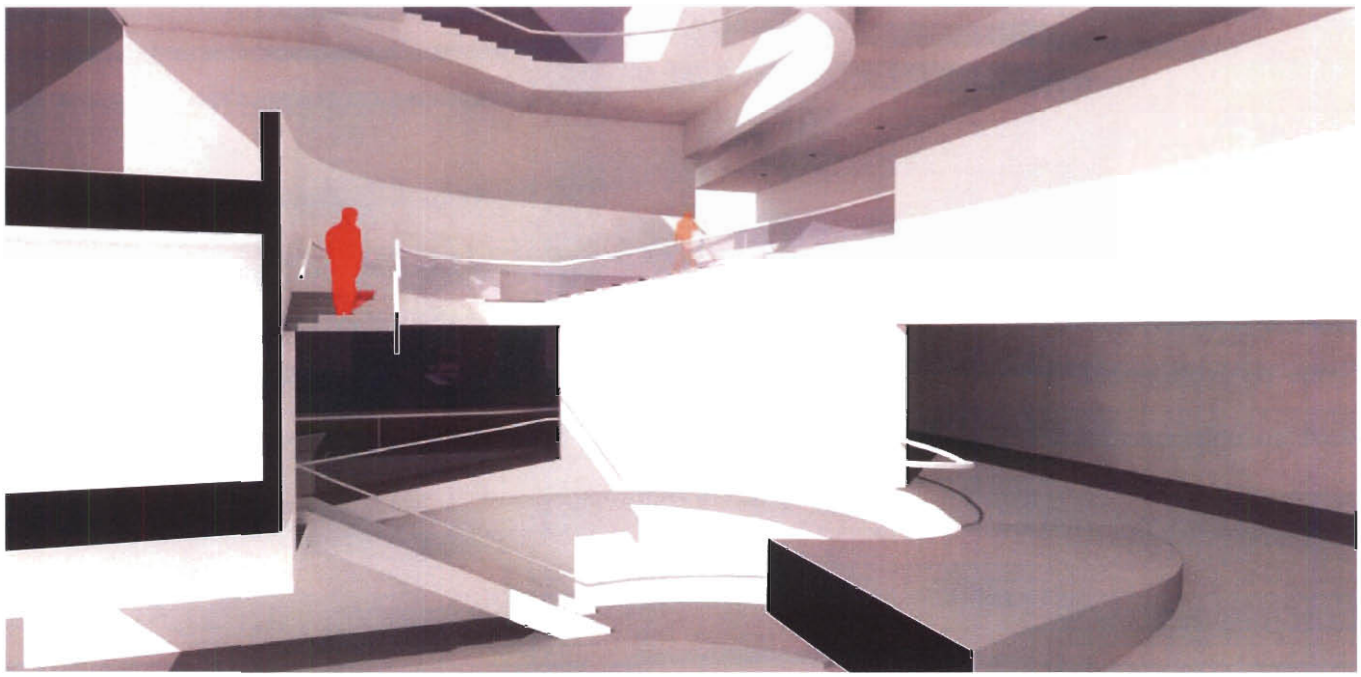

conference rm.
exhibition preparation
classroom
classroom
gallery (2x height)



3


3
library
archives / storage
storage
storage
gallery
gallery
gallery


conference
exhibition
preparation
classroom
classroom
gallery (2x height)



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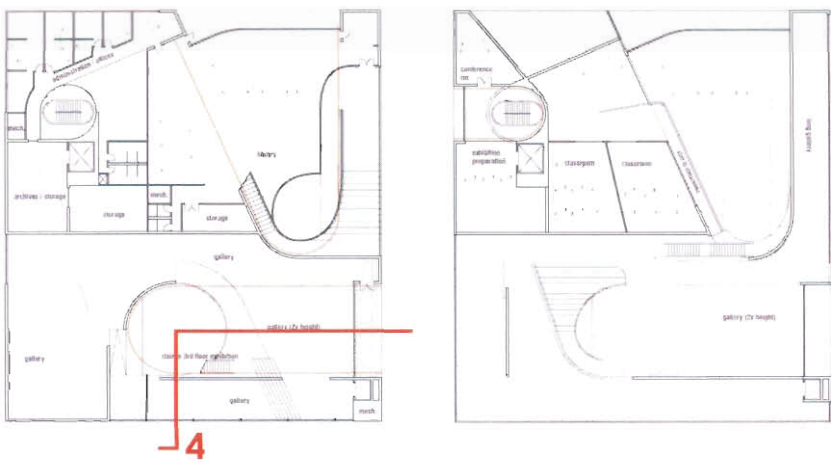

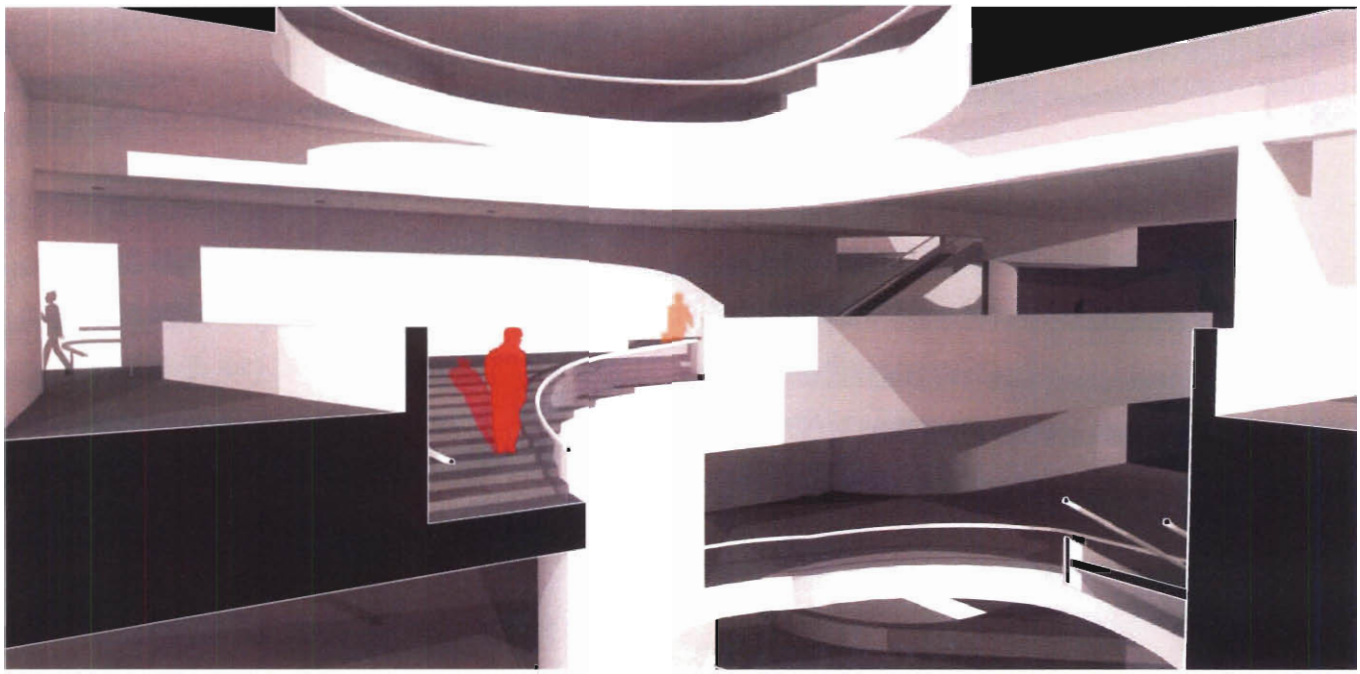

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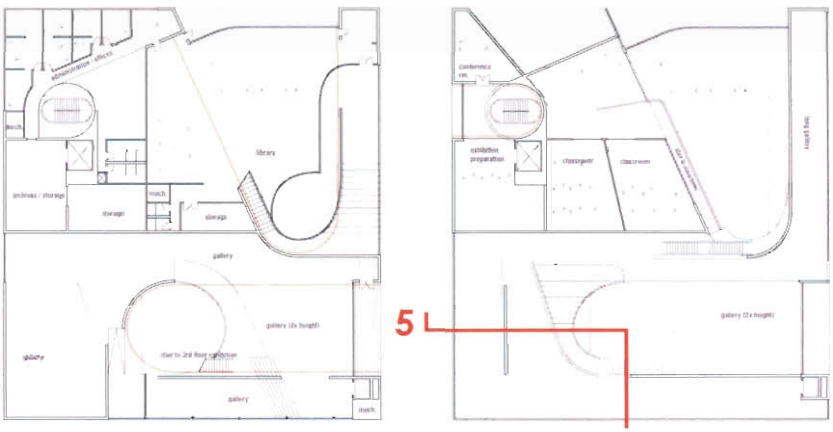

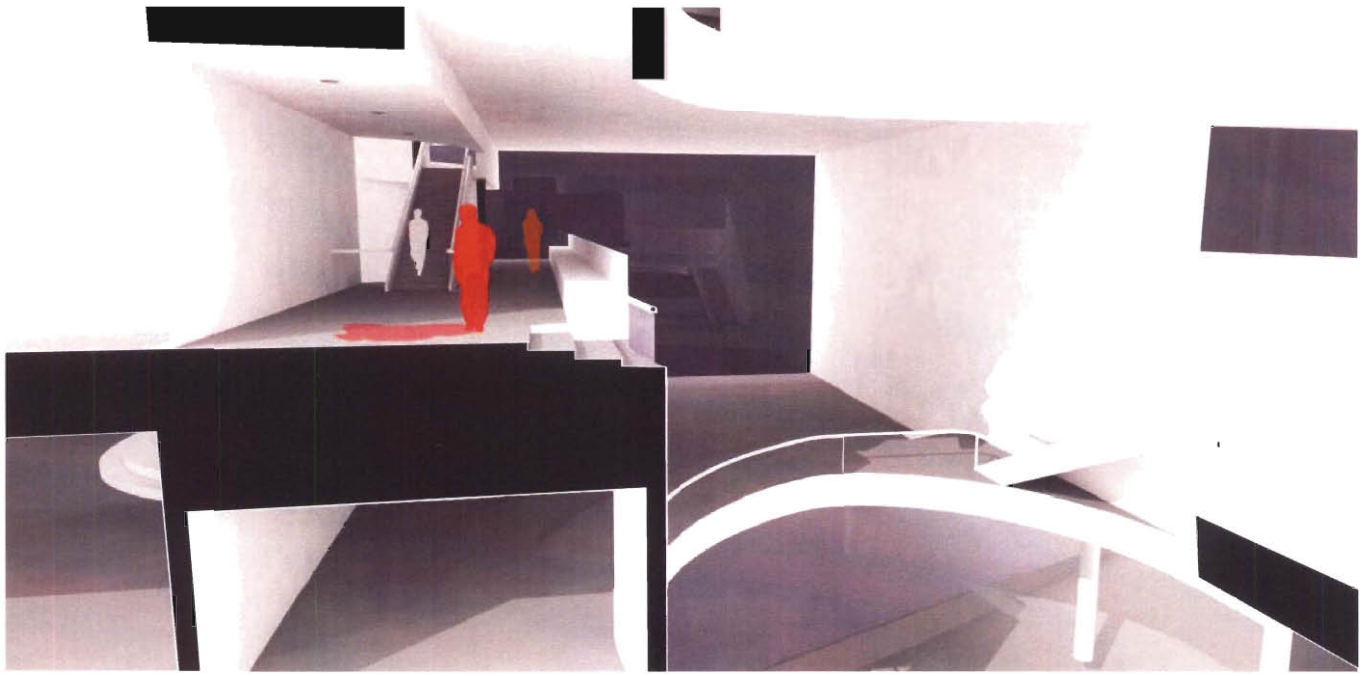

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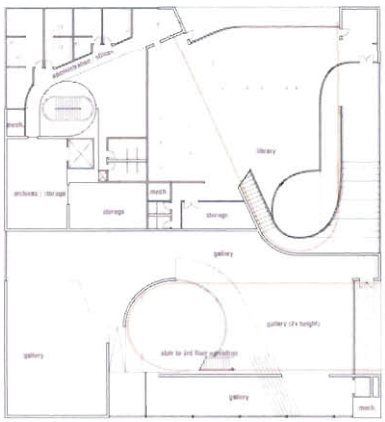
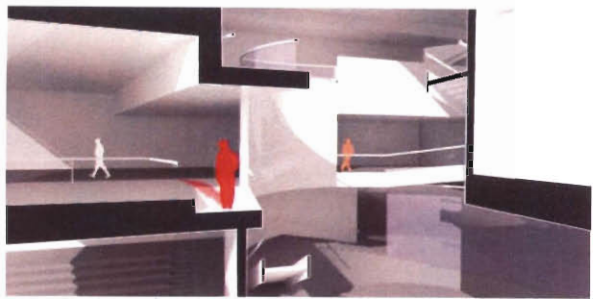
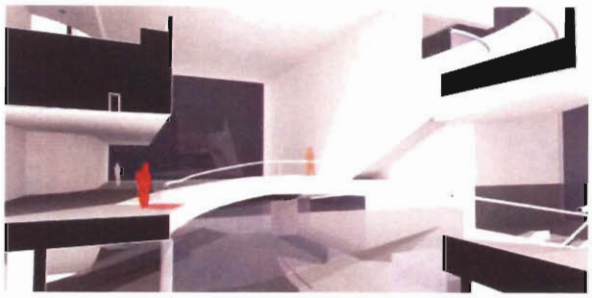
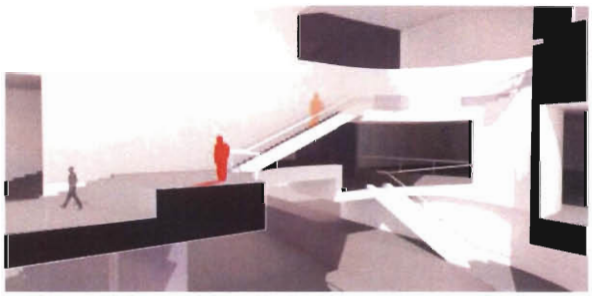
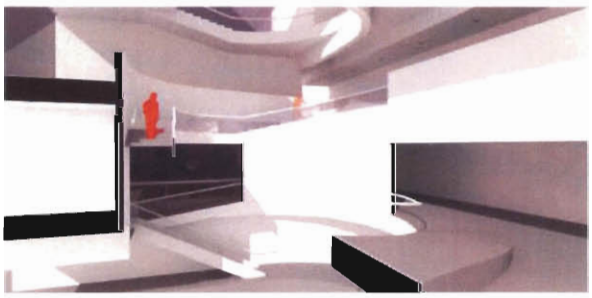

library
archives + storage
storage
storage
mech.
gallery
gallery (2 x height)
gallery
gallery
mech.

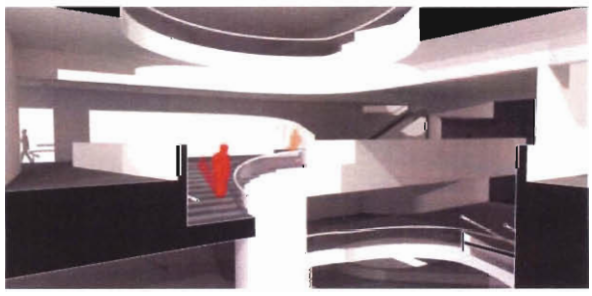

conference rm.
exhibition preparation
classroom
classroom
6
gallery (2 x height)

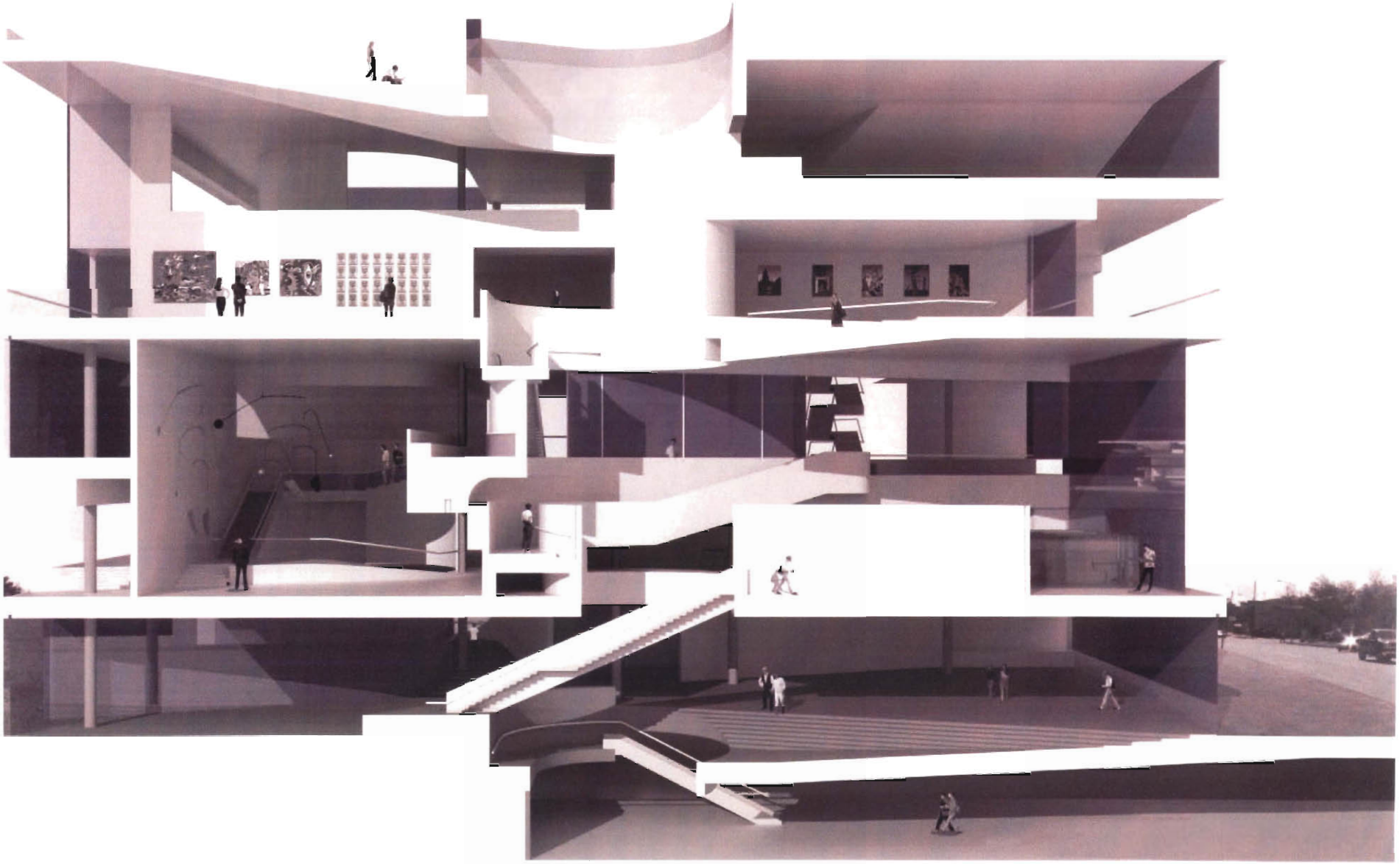




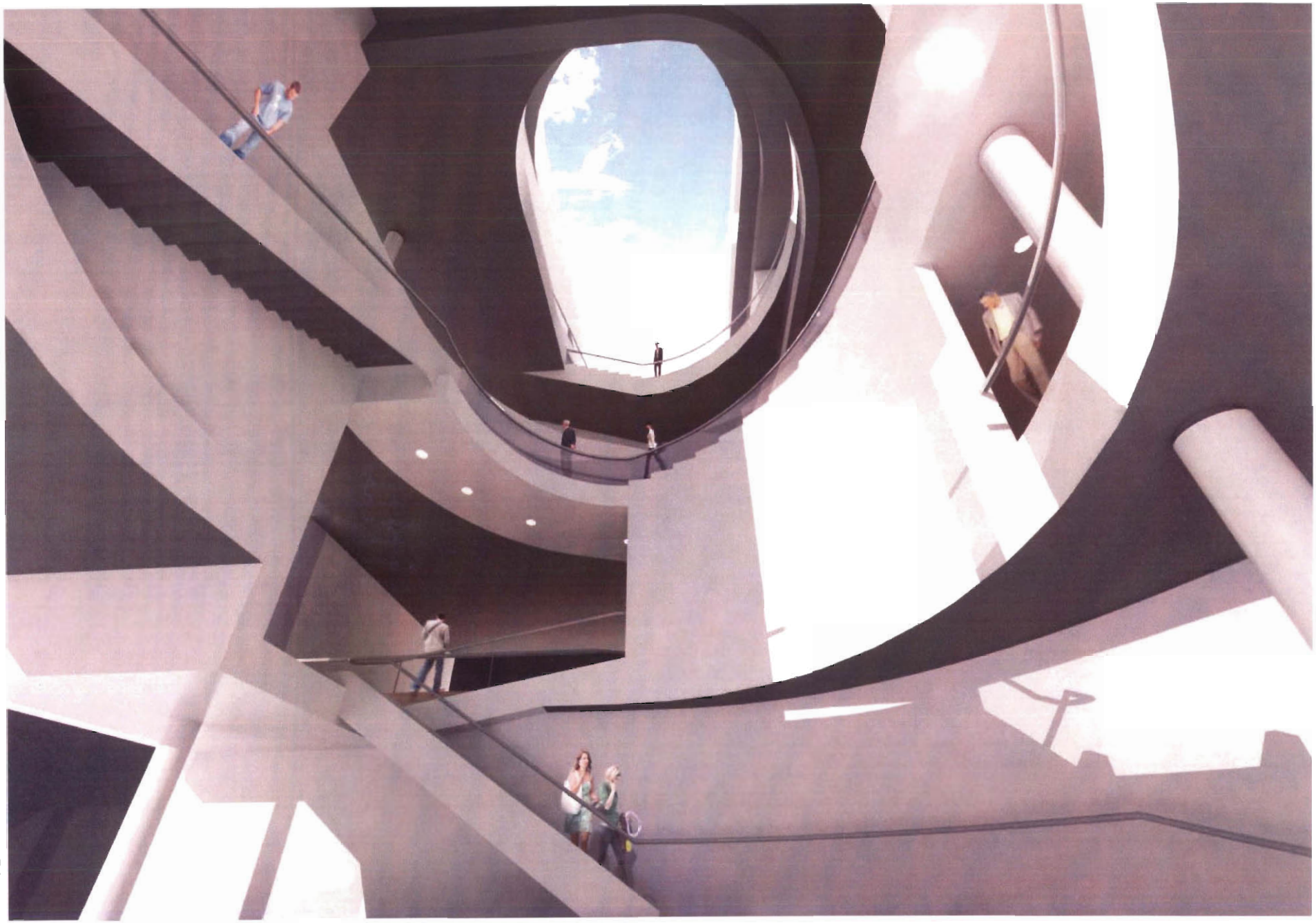








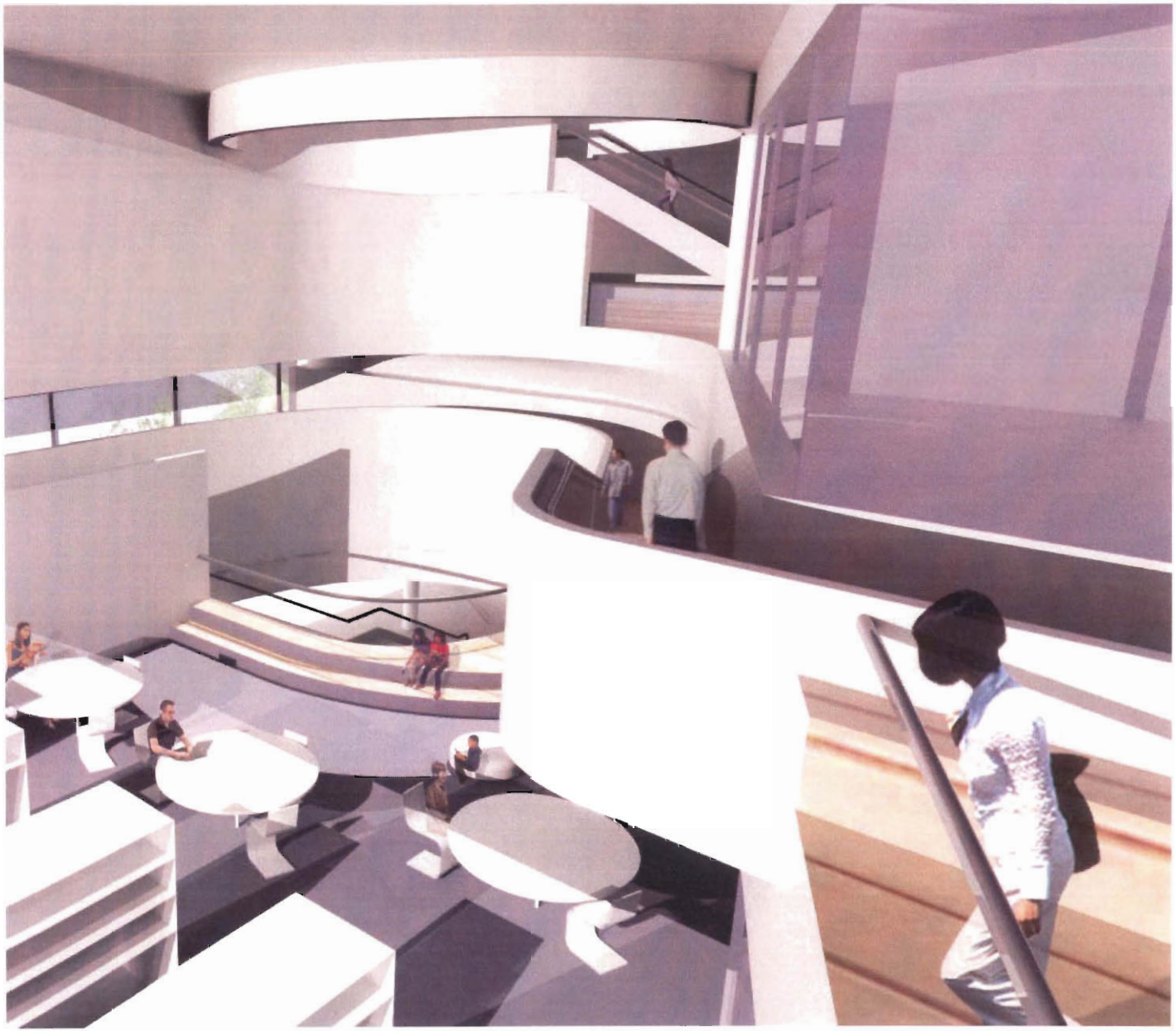
Section Perspective: *pivoting lobes - interlocking programs*



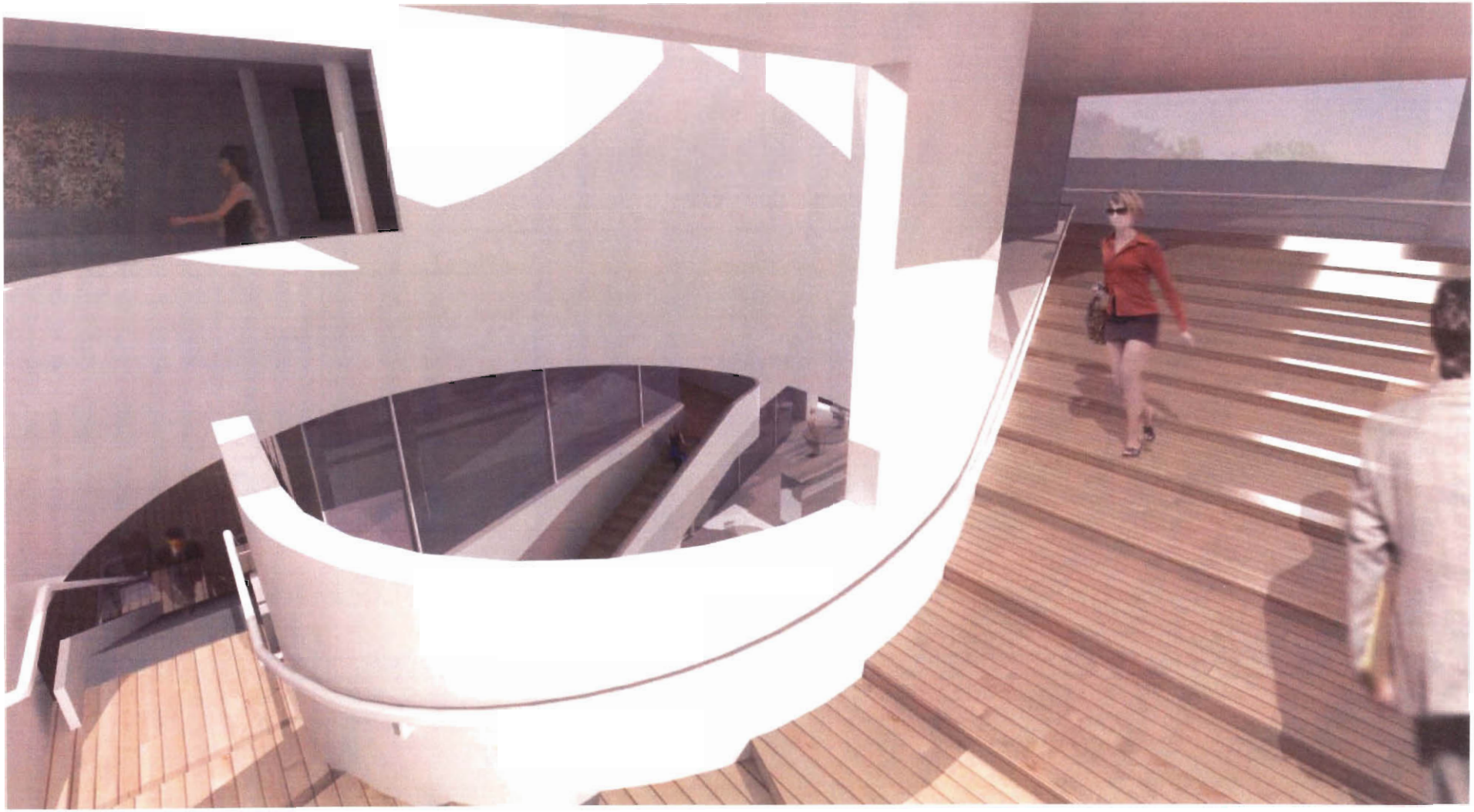
Offset and Tangent Recesses: *exhibition void*

Interrupted Interlock: *temporary exhibition lobe - second floor*

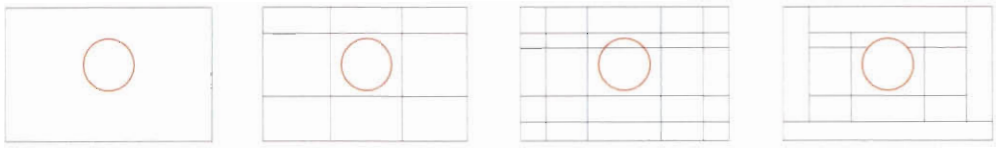
Interrupted Interlock: *galleries around exhibition lobe - third floor*

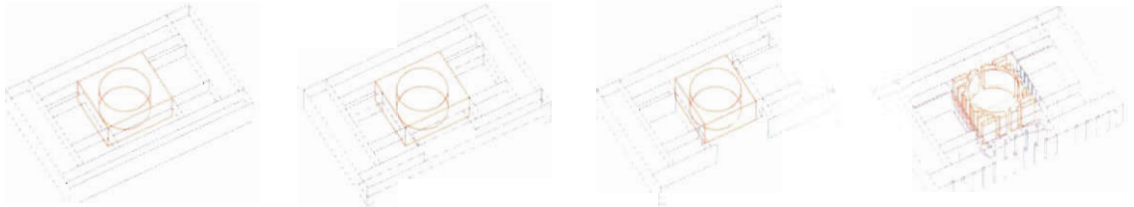


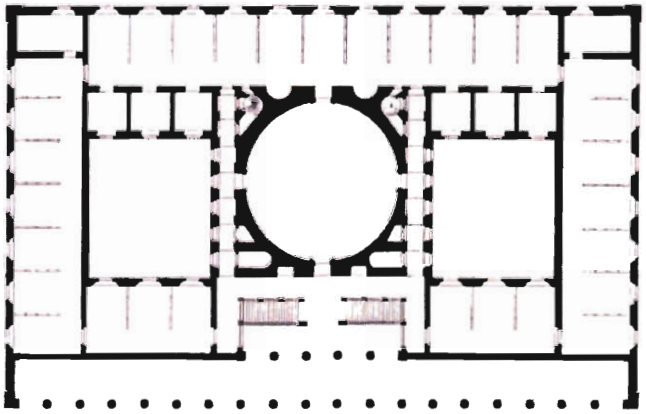
Library

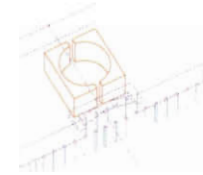


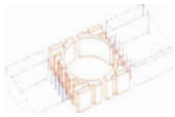
Swirling Vantage Point: *circulation directed by multiple views*



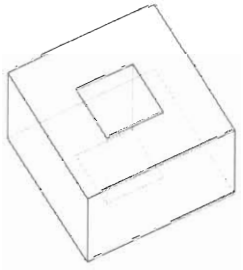
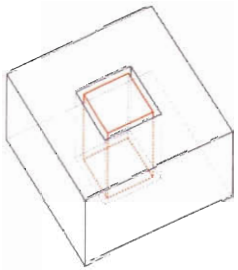
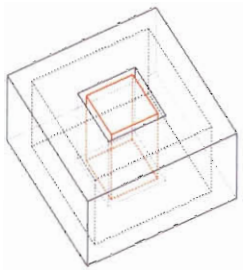
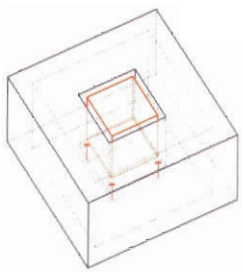
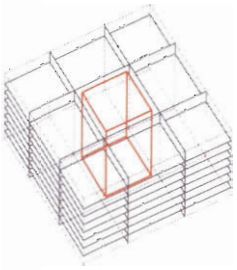
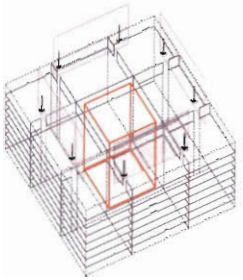
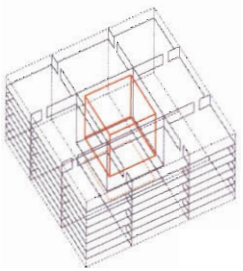
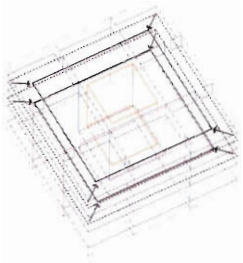
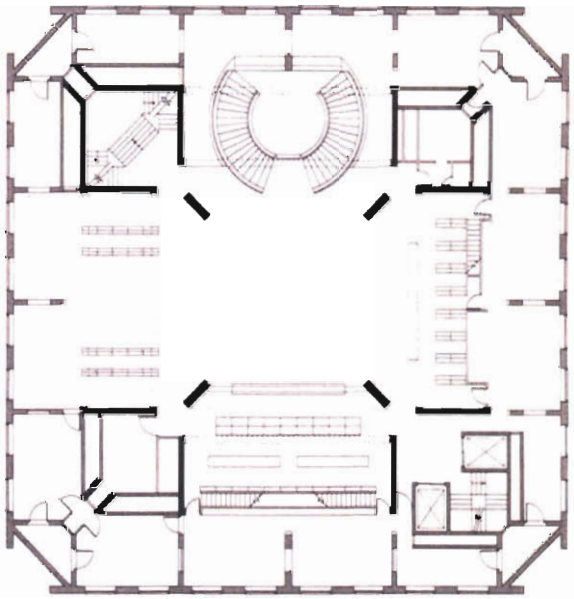
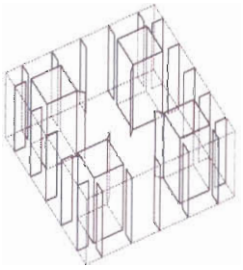
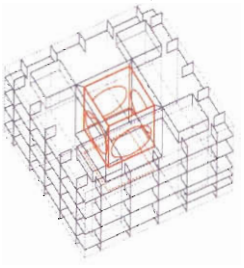
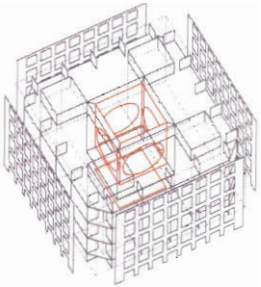






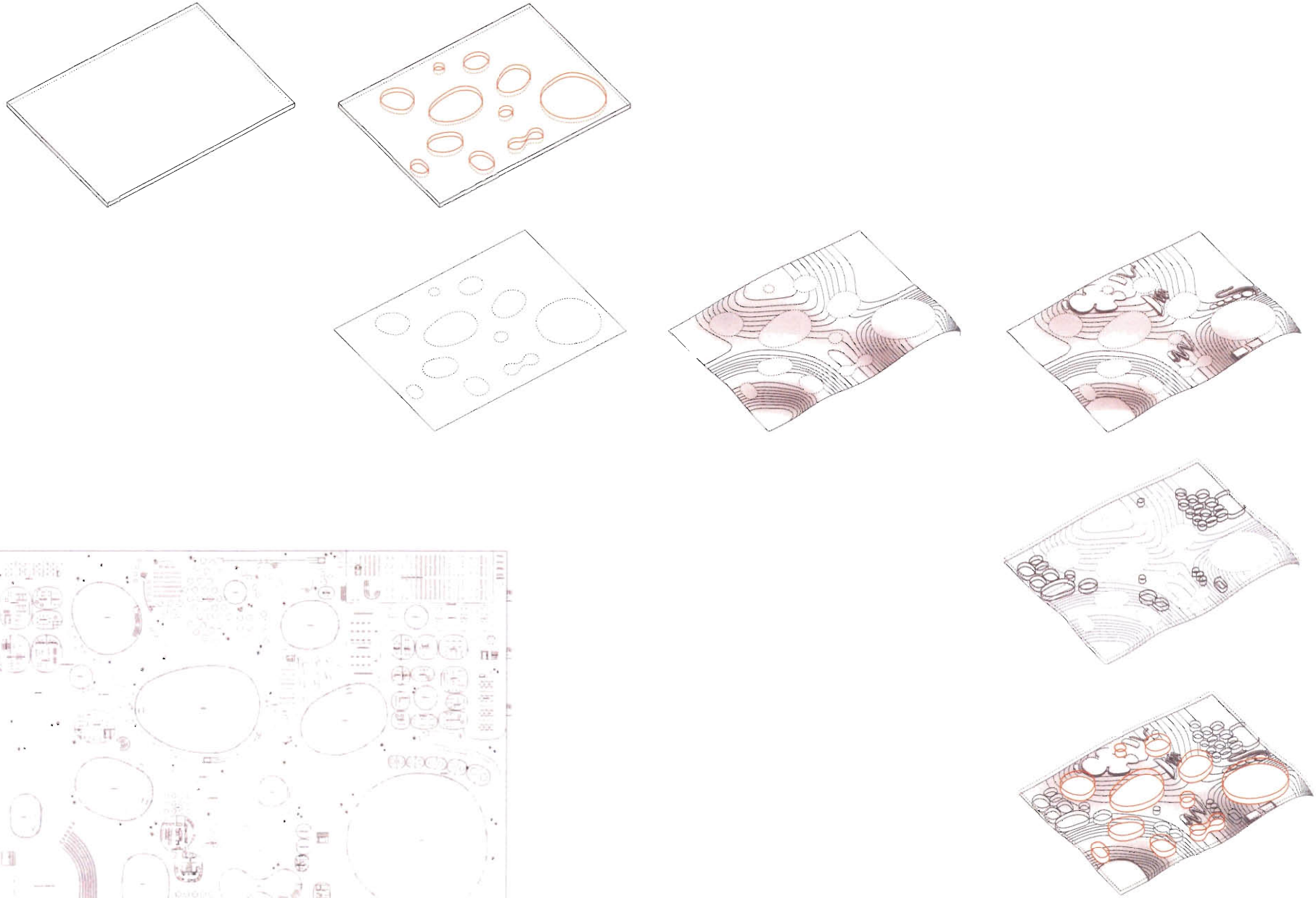


Altes Museum
K.F. Schinkel - Berlin, Germany 1830

Exeter Library

Louis Kahn - Exeter, New Hampshire 1972



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Notes

1)I introduce these examples in order to develop of a more specific definition of the void – a term that I think has been overused, especially in architecture schools. In this thesis, I refer to the void not in the same way as Eisenman or Koolhaas. Instead, I refer to its earlier/traditional connotations in which it has a legible geometry (in plan and volume), a vertical axis, and is either devoid of, or lacked a specific programmatic function.

2)I introduce the pinwheel as having broad influences on program and circulation. While only a handful of plans can be called a pinwheel, the basic techniques of open corners and extending edges in plan were important to modernism and still replayed in contemporary architecture.

3)To further explain the limits of the pinwheel technique, the following is an additional reading of the Johnson House and Brick Country House.

Wright – Johnson House
Despite the active periphery in the living room, the center and the extending bars are still disconnected. Once crossing the threshold, conventional space planning takes over, where each bedroom bar is still organized as rooms connected by a corridor.

Mies – Brick Country House
The explosion of cellular space is messy - it creates a fuzzy hierarchy where primary and secondary blur into a maze. Furthermore, its dependence on walls creates coincidental aliments for both visual and physical access – a challenge on needs for autonomy and specificity.

4)Here, I am mostly referring to Mies's Pinwheel in the Brick Country House. By sliding walls into other rooms, Mies creates interlocking spaces that depend on each other for integrity. This mutual dependence precludes either space from being functionally independent or understood with clear legibility.

5)By 'form' of circulation I mean its cross-sectional characterizes. For example, physical qualities of the circulation space - if it is enclosed, open on one side, or open on both sides. I also include aspects like proportion and scale.

By 'route' of circulation, I mean the configuration of its path. This involves aspects like intersections, splits, or directions.

Illustrations

Brick Country House
Carter, Peter. Mies van der Rohe at work . London: Phaidon, 1999.

Altes Museum
Schinkel, Karl Friedrich. K.F. Schinkel, collected architectural designs . New York, N.Y.: St. Martin's Press, 1982.

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McCarter, Robert. Louis I. Kahn . London: Phaidon, 2005.

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